WILDLAND FIRE MANAGEMENT PLAN

BIG MUDDY NFWR

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BIG MUDDY NFWR
GREAT LAKES-BIG RIVERS REGION

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1. INTRODUCTION

PURPOSE AND NEED FOR A FIRE MANAGEMENT PLAN

This document establishes a Fire Management Plan (FMP) for the Big Muddy National Fish and Wildlife Refuge (NFWR) located at 4200 New Haven Road, Columbia, MO 65201. The plan is written as an operational guide for managing the Refuge's wildland fire program. It defines levels of protection needed to (1) ensure safety of employees, visitors, and adjacent landowners; and (2) protect resources, given current understanding of the complex relationships in natural ecosystems. It is written to comply with both Departmental and Service-wide requirements that units with burnable vegetation develop a fire management plan (620 DM 1).

HOW FMP ACHIEVES LAND MANAGEMENT PLAN OBJECTIVES

The refuge is located along the lower Missouri River between Kansas City, MO and Saint Louis, MO. Currently, the refuge consists of nine units with approximately 16,700 acres. The majority of the refuge lies within the floodplain of the Missouri River and consists of a matrix of bottomland forest, upland forest, woodland, prairie, glades, and retired agricultural fields. Historically, this region was maintained by a variety of disturbances including flooding, wildfire, and grazing by elk, bison, and other herbivores. These disturbances served to invigorate native vegetation and provide for a diversity of habitat types. Management is concerned with maintaining and/or restoring the biological integrity, diversity, and environmental health of the refuge. This can best be accomplished through a process of both passive and active restoration techniques as well as an innovative and successful prescribed fire program.

Suppression actions discussed in this plan will assist in the protection of public and employee safety, human improvements, and natural habitat where necessary.

Prescribed fire will contribute to the maintenance of high quality wildlife habitat that is needed to achieve the Refuge's land management goals and objectives while facilitating the restoration of naitve habitat.

MEETING REGULATORY REQUIREMENTS

National Environmental Policy Act

An Environmental Assessment was prepared using the guidelines of the National Environmental Policy Act of 1969. The Act requires us to examine the effects of proposed actions on the natural and human environment. The purpose of the Environmental Assessment is to consider various alternatives for managing wildland fire on the refuge. This management direction is described in detail through the goals, objectives, and strategies outlined in this fire management plan. The action is needed to address current management issues and to establish what action

will be taken in regard to fire suppression and the future use of prescribed fire as a management tool.

It is the policy of the Fish and Wildlife Service to provide the public with the opportunity to participate in management planning. Therefore, this document will be available for a thirty day comment period following completion of the draft plan.

Section 7 Consultation

On those properties managed by the Fish and Wildlife Service, intra-Service section 7 consultations will be conducted to ensure that our proposed fire management activities are not likely to adversely affect any federally threatened or endangered species that may be present on those properties. Federal threatened or endangered species are listed in Appendix G.

Archeology

Archeological sites are reported in every county in which refuge lands are located. However, very few archeological sites have been identified on the refuge. Some loss of resources can occur as a result of erosion or other natural processes, or from unauthorized collecting and vandalism. Native American remains and cultural objects found on the refuge are subject to repatriation to descendents and culturally affiliated tribes. At this time, culturally affiliated tribes include the Missouri, Osage, and Kansas tribes. Other artifacts, including any Native American remains and cultural objects not repatriated, collected from refuge lands will be preserved in approved repositories. At this time the approved repository for service lands in Missouri is the University of Missouri at Columbia. Collection and excavation of archeological material on refuge lands is permitted only when conducted in the public interest. The regional director regulates collection and excavation through the issuance of permits.

COLLABORATIVE DEVELOPMENT PROCESS FOR LAND MANAGEMENT PLAN AND FMP

The Big Muddy NFWR Interim Comprehensive Management Plan emphasized the utility of prescribed fire as a management tool for reaching habitat objectives. Prescribed fire is a management strategy that can provide disturbance in order to maintain fire adapted communities in a less than climax condition. Prescribed fire has the potential to be utilized on refuge lands containing fire adapted plant communites.

AUTHORITIES FOR FMP DEVELOPMENT

Authority and guidance for developing and implementing this plan are found in:

- Protection Act of September 20, 1922 (42 Stat. 857; 16 U.S.C.594): authorizes the Secretary of the Interior to protect from fire, lands under the jurisdiction of the Department directly or in cooperation with other Federal agencies, states, or owners of timber.
- Economy Act of June 30, 1932: authorizes contracts for services with other Federal agencies.

- Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1856a and b): authorizes reciprocal fire protection agreements with any fire organization for mutual aid with or without reimbursement and allows for emergency assistance in the vicinity of agency lands in suppressing fires when no agreement exists.
- Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C. 5121): authorizes Federal agencies to assist state and local governments during emergency or major disaster by direction of the President.
- Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C.2201): provides for reimbursement to state or local fire services for costs of firefighting on federal property.
- Wildfire Suppression Assistance Act of 1989 (P.L. 100-428, as amended by P.L. 101- 11, April 7, 1989).
- Departmental Manual (Interior), Part 620 DM, Chapter 1, Wildland Fire Management: General Policy and Procedures (April 10, 1998): defines Department of Interior fire management policies.
- Service Manual, Part 621, Fire Management (February 7, 2000): defines U.S. Fish and Wildlife Service fire management policies.
- National Wildlife Refuge System Administrative Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd et seq.: defines the National Wildlife Refuge System as including wildlife refuges, areas for the protection and conservation of fish and wildlife which are threatened with extinction, wildlife ranges, game ranges, wildlife management areas and waterfowl production areas. It also establishes a conservation mission for the Refuge System, defines guiding principles and directs the Secretary of the Interior to ensure that biological integrity and environmental health of the system are maintained and that growth of the system supports the mission.
- National Environmental Policy Act of 1969: regulations implementing the National Environmental Policy Act encourage the combination of environmental comments with other agency documents to reduce duplication and paperwork (40 CFR 1500.4(o) and 1506.4).
- Clean Air Act (42 United State Code (USC) 7401 et seq.): requires states to attain and maintain the national ambient air quality standards adopted to protect health and welfare. This encourages states to implement smoke management programs to mitigate the public health and welfare impacts of Wildland and prescribed fires managed for resource benefit.
- Endangered Species Act of 1973.
- U.S. Fish & Wildlife Service Fire Management Handbook.
- Interagency Standards for Fire and Fire Aviation Operations, Department of the Interior-Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, and Department of Agriculture-Forest Service, January 2006.
- National Fire Plan, Departments of Interior and Agriculture, 2001.
- 10-Year Comprehensive Strategy Implementation Plan, Departments of Interior and Agriculture, 2002.
- Draft Cohesive Strategy for Protecting People and Sustaining Resources in Fire-Adapted Ecosystems, Departments of Interior and Agriculture, 2001.

- Comprehensive Management Plan, U.S. Fish and Wildlife Service, Union Slough National Wildlife Refuge, December 1996.
- Northern Tallgrass Prairie National Wildlife Refuge, Iowa and Minnesota, Final Environmental Impact Statement, 1998.

2. POLICY, LAND MANAGEMENT PLANNING AND PARTNERSHIP

2.1 FIRE POLICY

Fish and Wildlife Service fire management policy is based on the Departmental Manual (620 DM 1) and the 2001 Federal Wildland Fire Policy. **Firefighter and public safety is the first priority**. All Fire Management Plans and activities must reflect this commitment. With the possible exception of instances where the life of another is threatened, no Service employee, contractor, or cooperator will be purposely exposed to life-threatening conditions or situations (See 241 FW 7).

Only trained and qualified people will be assigned to fire management duties. Fire management personnel will meet training and qualification standards established or adopted by the Service for the position they occupy. Agency Administrators will meet training standards established or adopted by the Service for the position they occupy. Employees who are trained and certified for fire positions will participate in the wildland fire management program as the situation demands. Non-certified employees with operational, administrative, or other skills will support the wildland fire management program as needed. Agency Administrators will be responsible, be held accountable, and make employees available to participate in the wildland fire management program.

Fire management planning, preparedness, wildland and prescribed fire operations, monitoring, and research will be conducted on an interagency basis with the involvement of all partners when appropriate. Every area with burnable vegetation must have an approved Fire Management Plan. Fire Management Plans must provide for firefighter and public safety, identify values to be protected, support land, natural, and cultural resource management plans, and address public health issues. Fire Management Plans must also address all potential wildland fire occurrences and may include the full range of appropriate management responses. Fire Management Plans must be coordinated, reviewed, and approved by the responsible agency administrator, to ensure consistency with approved land management plans.

Fire, as an ecological process, will be integrated into resource management plans and activities on a landscape scale, across jurisdictional boundaries, and will be based upon best available science. All use of fire for natural and cultural resource management requires an approved plan which contains a formal prescription. Wildland fire will be used to meet identified resource management objectives when appropriate.

The Service will employ prescribed fire whenever it is an appropriate tool for managing Service resources and to protect against unwanted wildland fire whenever it threatens human life, property and natural/cultural resources. Once people have been committed to an incident, these human resources become the highest value to be protected. If it becomes necessary to prioritize between property and natural/cultural resources, this is done based on relative values to be protected, commensurate with fire management costs.

Regions will ensure their capability to provide safe, cost-effective fire management programs in support of land, natural, and cultural resource management plans through appropriate planning, staffing, training, and equipment.

Management actions taken on wildland fires must consider firefighter and public safety, be cost effective, consider benefits and values to be protected, and be consistent with natural and cultural resource objectives. Refuges will work with their local cooperators and the public to prevent unauthorized ignition of wildland fires on Service lands.

Structural firefighting is not the functional responsibility of the Service. Service assistance in structure protection should only be performed on an emergency basis to save lives. (See Fire Management Handbook, 1.5.4) Fire management policies and procedures for safety, training and equipment are mandatory. See 241 FW 7 (Safety Operations - Firefighting), 232 FW 6 (Firefighting Training), and 241 FW 3 (Personal Protective Equipment).

Further clarification and interpretation of policy may be found in Section 1.1.2 of the FWS Fire Management Handbook.

RELATIONSHIP OF FMP TO ENABLING LEGISLATION AND PURPOSE OF UNITS

The Migratory Bird Treaty Act of 1918 implemented the 1916 migratory bird treaty that the United States had entered into with Great Britain, on behalf of Canada. The treaty obligated the federal government to be involved in the care of migratory birds while in the United States or its possessions. The Migratory Bird Treaty Act provided for regulations controlling the take, sale, transportation and importation of migratory birds.

Congress passed the Migratory Bird Conservation Act of 1929 allowing for the protection of migratory birds including the responsibility to provide breeding, nesting, and wintering habitat. The Act authorizes the acquisition of migratory bird refuges and establishes a Migratory Bird Conservation Commission to evaluate migratory waterfowl habitat proposed for acquisition.

The Migratory Bird Hunting Stamp Act of 1934 authorized the annual issuance of what is popularly known as the Federal Duck Stamp. The first stamp price was $1 and the Act specified that proceeds go into a special treasury account, the Migratory Bird Conservation Fund. The receipts from the sale of the stamps are to be used to buy land for the custodianship of waterfowl while they are within the borders of the United States. Not less than 90 percent of the account could be used for the purchase, development, and maintenance of waterfowl refuges.

On August 1, 1958, Public Law 85-585 amended the Migratory Bird Hunting Stamp Act to increase the price of the stamp to $3 and earmarked the proceeds, less the actual expenses connected with the sale of the stamps, for the acquisition of migratory bird refuges and "waterfowl production areas". The Migratory Bird Hunting Stamp Act created a continuing source of funds for waterfowl habitat acquisition and restoration by requiring waterfowl hunters to purchase a Federal Duck Stamp before they hunt waterfowl.

Big Muddy National Fish and Wildlife Refuge

The Big Muddy NFWR was established under the authority of the Fish and Wildlife Act of 1954 and currently consists of nine units. The Refuge was established on September 9, 1994, "…for the development, advancement, management, conservation, and protection of fish and wildlife resources…" (16 U.S.C. 742f(a)(4)). The Refuge's intention is to fill a public need to preserve and restore natural river floodplain, manage fish and wildlife habitats, and provide for compatible use.

The Refuge currently consists of nine units totaling approximately 16,700 acres, including Jackass Bend, Cranberry Bend, Baltmiore Bottoms, Jamsion Island, Lisbon Bottoms, Overton Bottoms, St. Aubert Island, Boone's Crossing, and Cora Island (Figures 1 - 10). Approximately 60,000 acres of floodplain land may eventually be purchased or protected. A refuge of this size will contribute to river ecosystem conservation and restoration, threatened and endangered species recovery, neotropical migrant bird conservation, biological diversity, and public outdoor recreation opportunities.

Figure 1 – Big Muddy NFWR with relative location of refuge units.

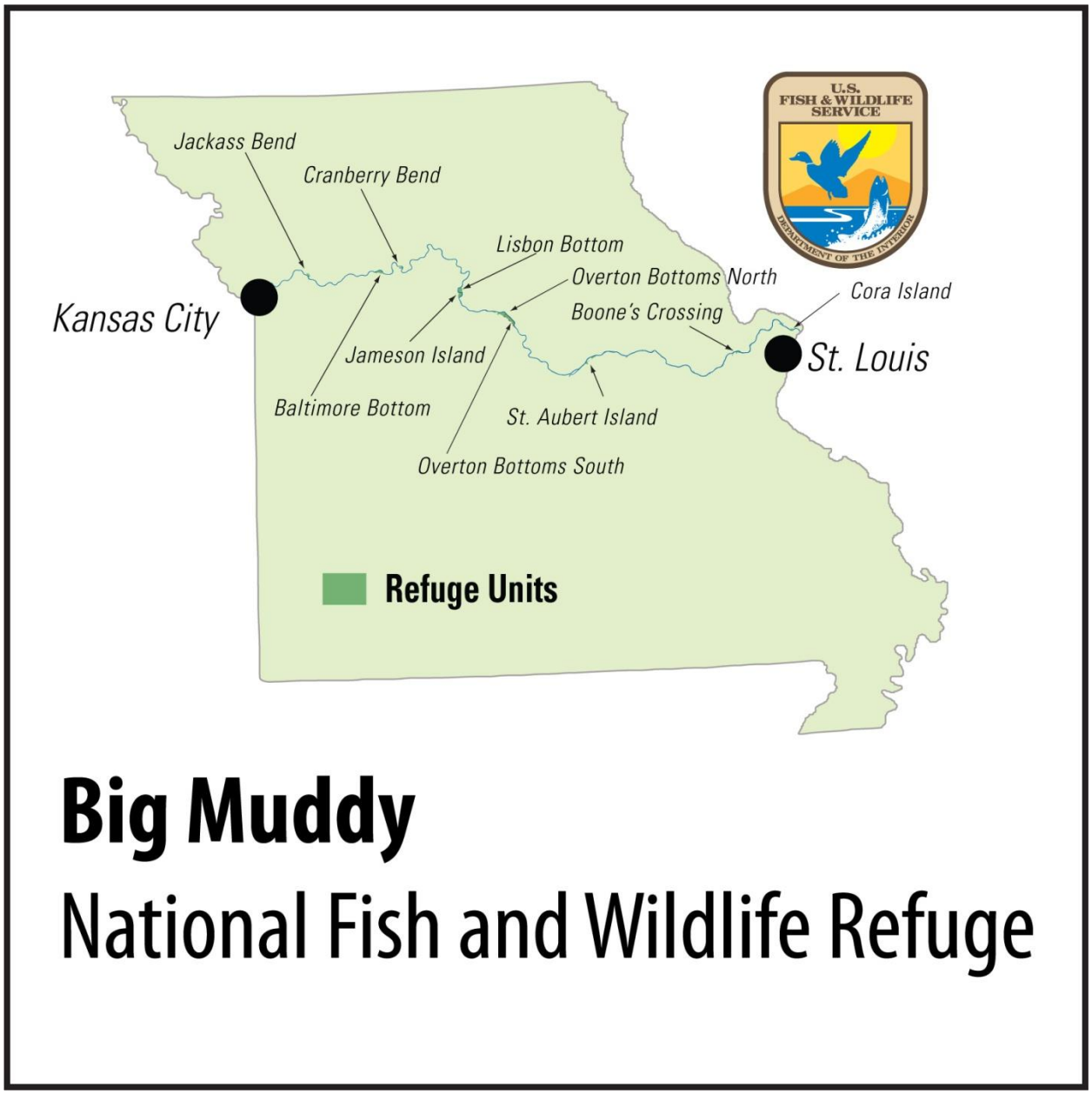


Figure 2 – Big Muddy NFWR – Jackass Bend

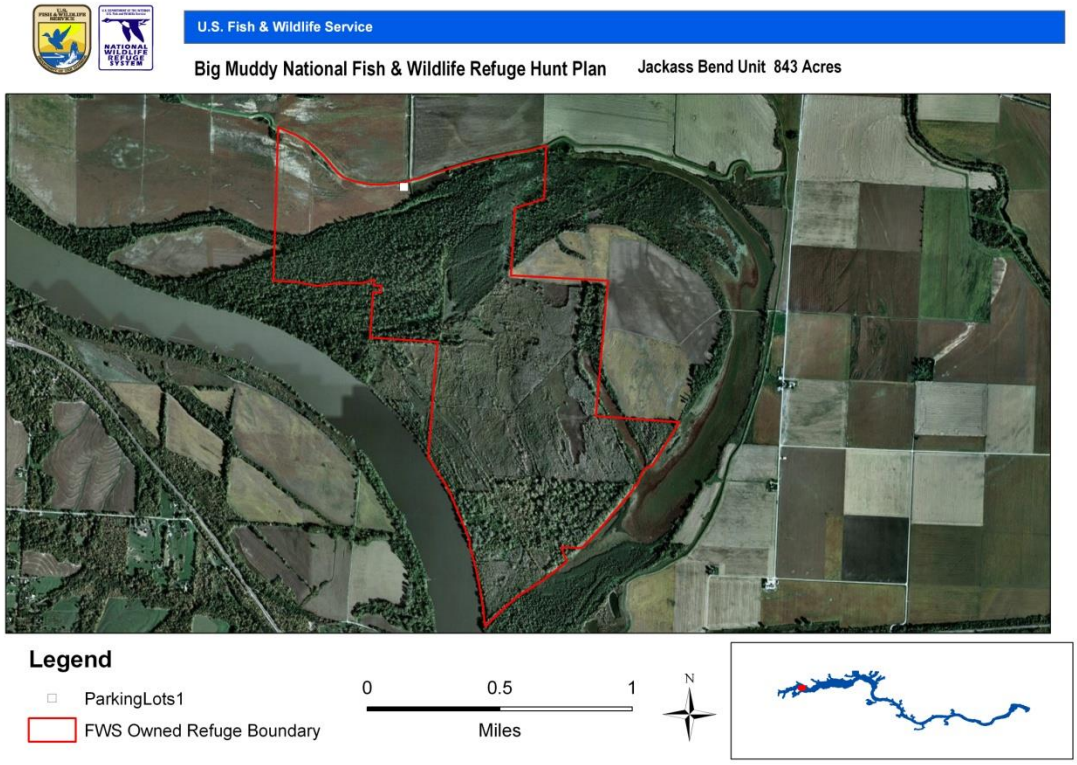


Figure 3 – Big Muddy NFWR – Cranberry Bend

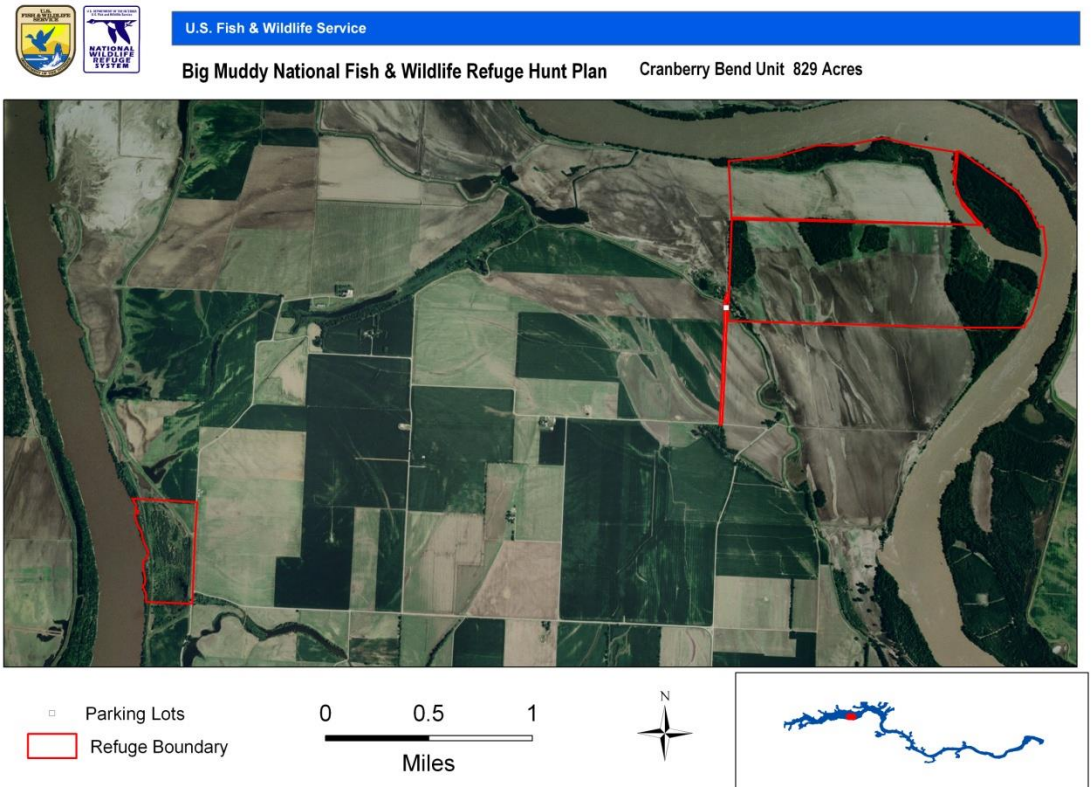


Figure 4 – Big Muddy NFWR – Baltimore Bottoms

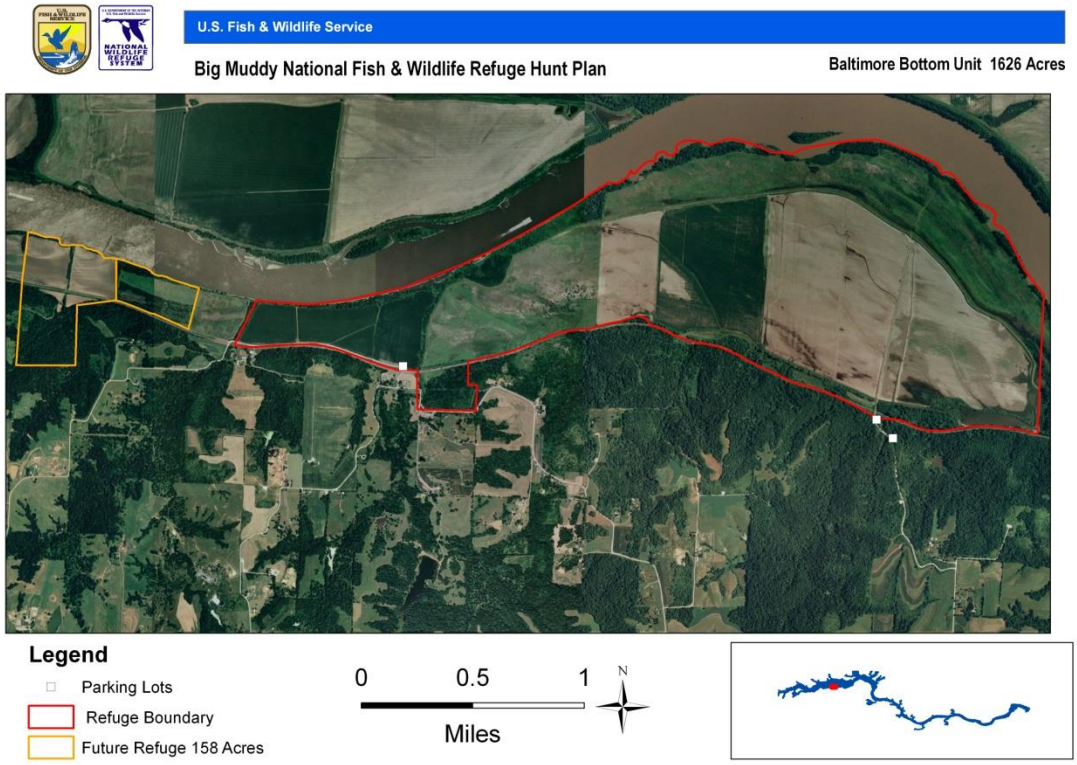


Figure 5 – Big Muddy NFWR – Jamison Island

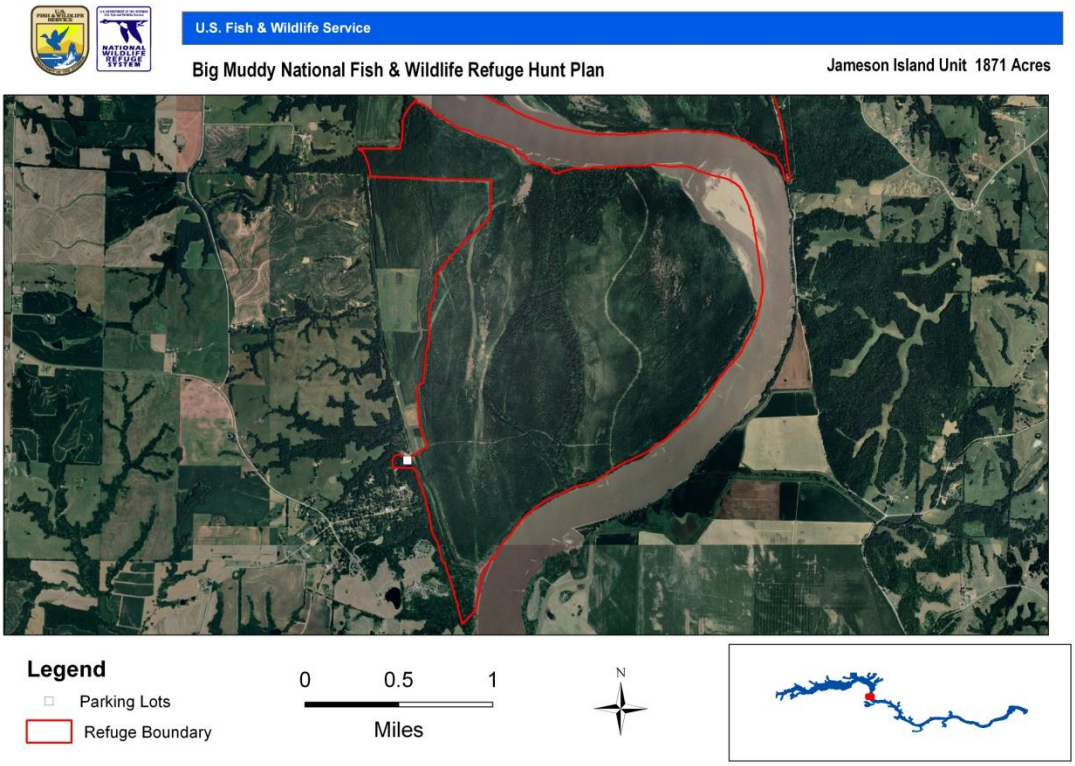


Figure 6 – Big Muddy NFWR – Lisbon Bottoms

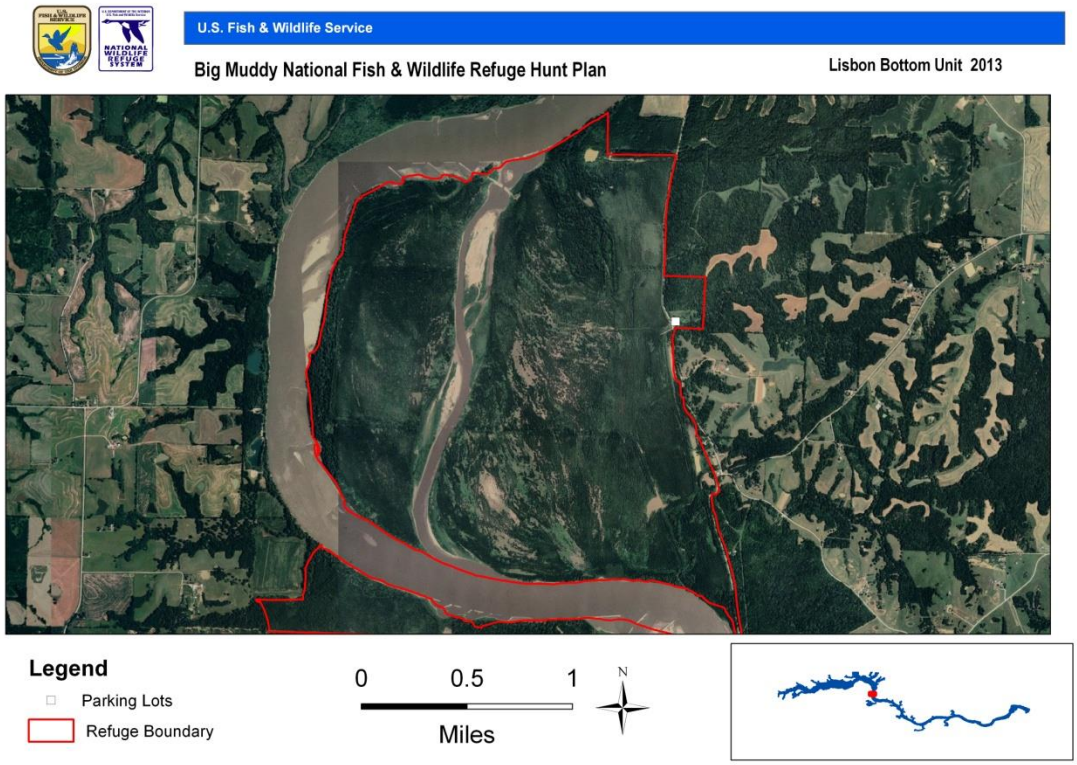


Figure 7 – Big Muddy NFWR – Overton Bottoms

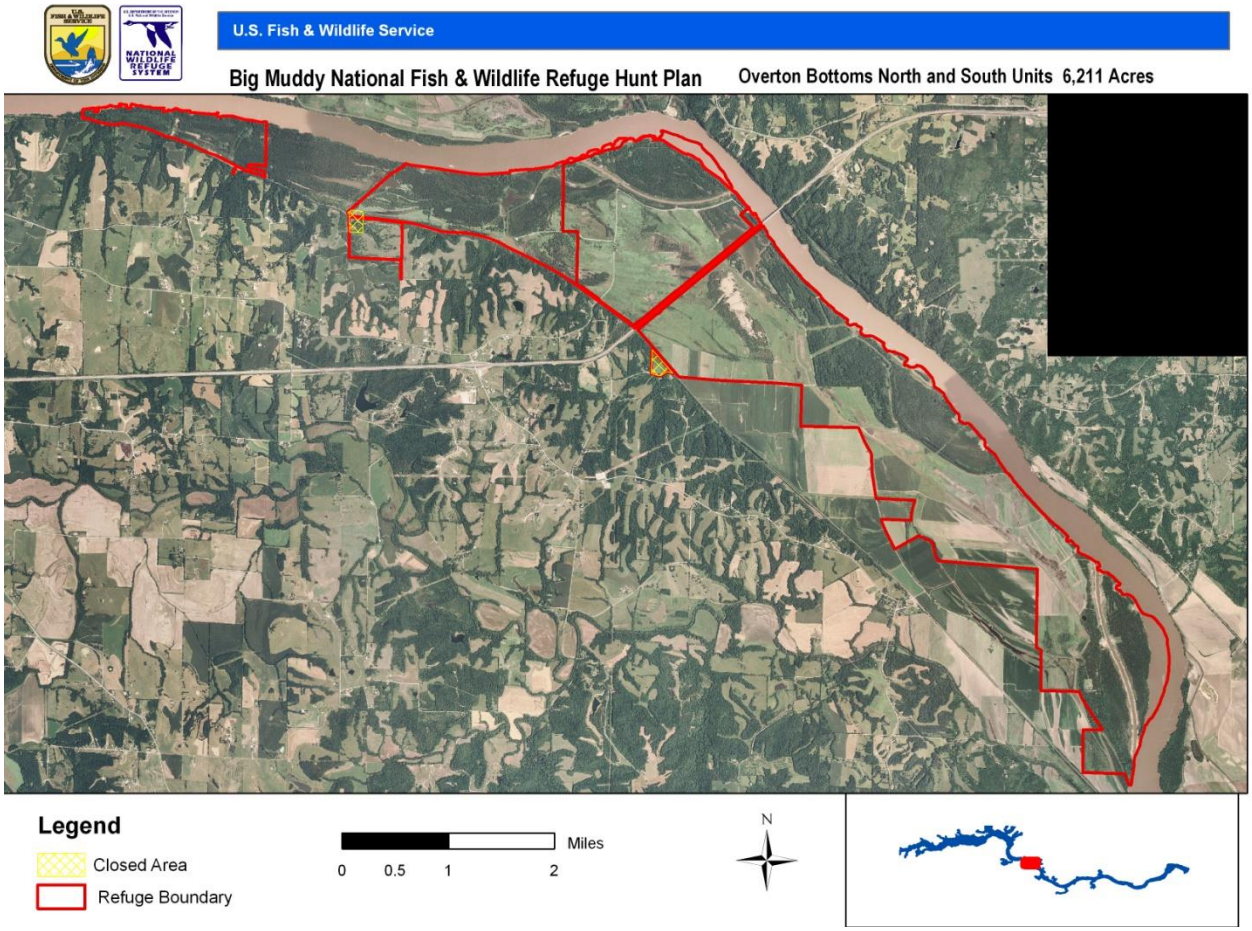


Figure 8 – Big Muddy NFWR – St. Aubert Island

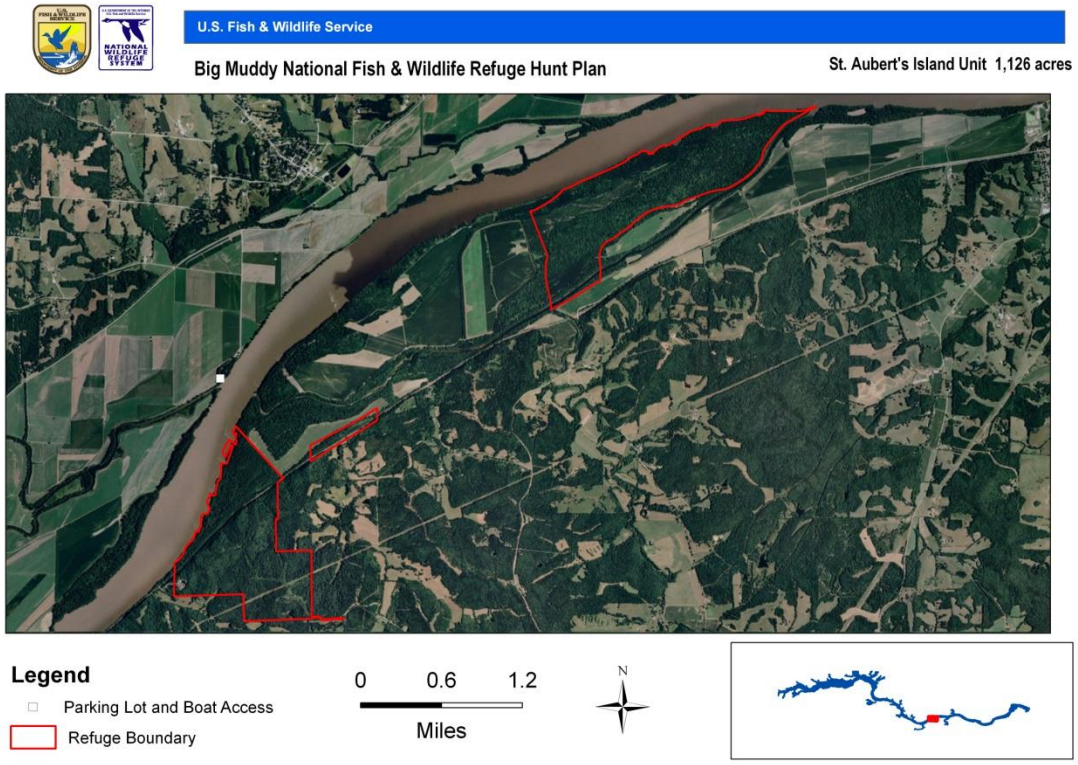


Figure 9 – Big Muddy NFWR – Boone's Crossing

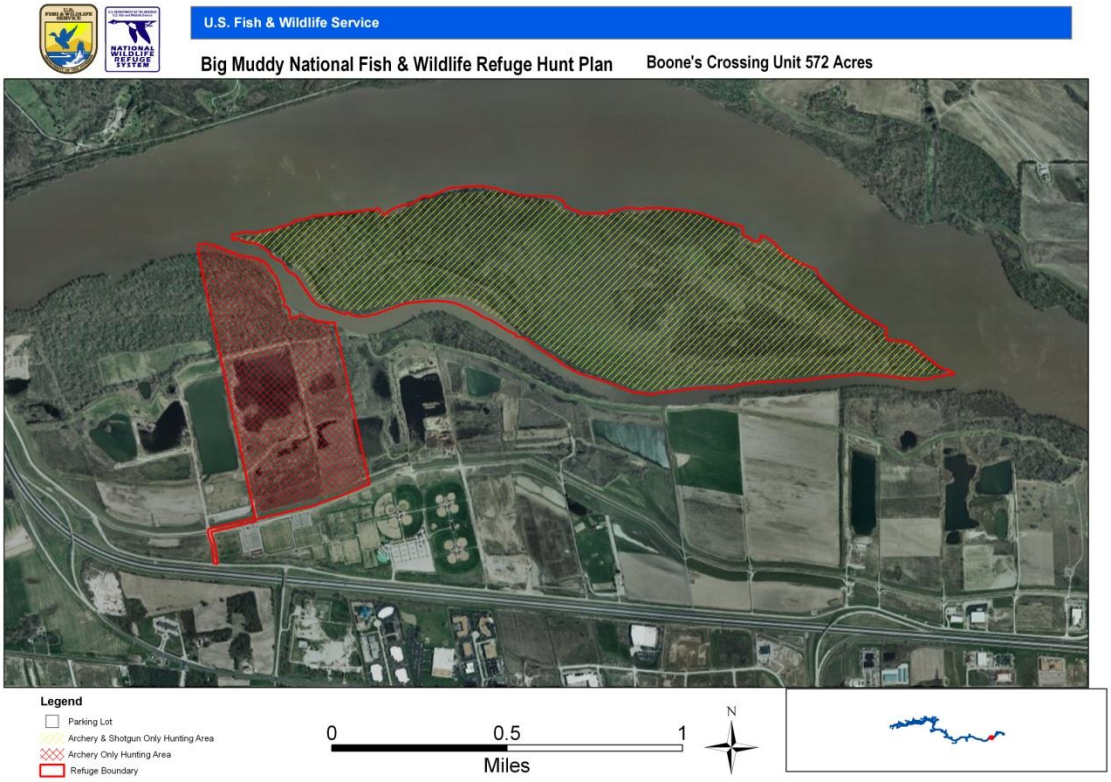
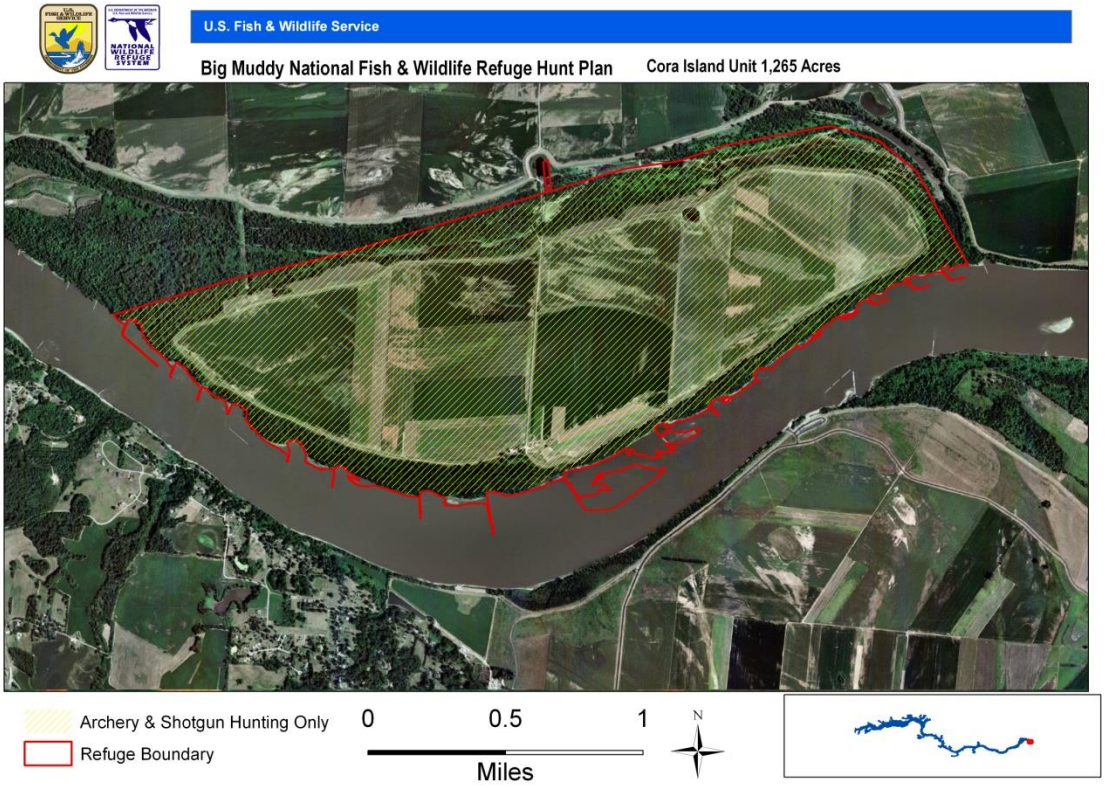


Figure 10 - Big Muddy NFWR – Cora Island



2.2 LAND/RESOURCE MANAGEMENT PLANNING

SUMMARY OF SIGNIFICANT RESOURCES AND VALUES

The restoration and maintenance of high quality habitat is a crucial component of the overall management plan for the refuge. Lands included in the refuge provide food and habitat for a variety of wildlife speices in a landscape generally dominated by agriculture.

Wildfires occurring under certain climatic conditions and seasons may have adverse effects on Fish and Wildlife Service lands and the wildlife dependant upon them. Wildfires occurring on the refuge may pose a risk to people and private property.

Prescribed fire will contribute to the maintenance of high quality wildlife habitat that is needed to achieve the refuge's land management goals and objectives while facilitating the restoration of native vegetation.

BROAD MANAGEMENT PLAN DIRECTION PERTINENT TO FMP

Management goals of the refuge are to restore portions of the lower Missouri River to a natural floodplain condition, including bottomland forest, improve and restore wetland values, improve fishery and wildlife resources, and to provide additional public areas for fish and wildlife-dependent reacreation.

Fire management, particularly the use of prescribed fire, can contribute to this management objective. Prescribed fire will be used to encourage native vegetation and enhance the overall quality of habitat.

Land Management Goals and Objectives

The Refuge Administration Act, as amended, clearly establishes that wildlife conservation is the singular National Wildlife Refuge System mission. House Report 105-106 accompanying the National Wildlife Refuge System Improvement Act of 1997 states "… the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first."

The Refuge Administration Act also states that each refuge will be managed to fulfill refuge purpose(s) as well as to help fulfill the System mission, and we will accomplish these purpose(s) and our mission by ensuring that the biological integrity, diversity, and environmental health of each refuge are maintained, and where appropriate, restored.

Management, ranging from preservation to active manipulation of habitats and populations, is necessary to maintain biological integrity, diversity, and environmental health. We favor management that restores or mimics natural ecosystem processes or functions to achieve refuge purpose(s).
The land management goals and objectives for Big Muddy NFWR are:

- Restoration of habitat sufficient to protect federally-listed, threatended, and endangered

species and candidate species within the project area.

- Restoration of natural floodplain conditions and associated native habitats including bottomland forest, wetlands, wet prairie, and other grasslands.
- Restoration of natural riverine functions on public lands.
- Conserve, manage, and restore the biodiversity and abundance of native endemic fish and wildlife populations.
- Provide additional public areas for compatible fish and wildlife oriented recreation and increase public understanding of Missouri River resources.

Desired Future Condition

The desired future habitat condition for the refuge is to have a functional floodplain ecosystem that is dynamic and productive. The use of prescribed fire will be essential in the restoration and maintenance of a variety of habitats.

3. WILDLAND FIRE MANAGEMENT STRATEGIES

3.1 GENERAL MANAGEMENT CONSIDERATIONS

Area-wide Considerations

Interagency Relationships

Coordination between the Fish and Wildlife Service and other interested parties will be critically important to a successful wildland fire program. The refuge will coordinate with other state and federal natural resource agencies, local municipalities, rural fire departments, and adjoining landowners to ensure a safe and productive wildland fire program. Refuge lands reside in areas traditionally affected by naturally occurring fires, local cooperative efforts related to wildland fire suppression will need to be negotiated. The use of the Rural Fire Assistance program strengthens the local bond between the federal government and rural fire departments. The Rural Fire Assistance program is a federal law enacted to help rural fire departments improve their wildland firefighting capabilities. Region 3 will concentrate its allocation of Rural Fire Assistance program funding on financial assistance to rural fire departments serving the communities near complex lands.

Regional Strategies

Current regional fire management policy follows the direction set forth under the National Fire Plan. This includes the umbrella of programs comprising the National Fire Plan; including, the 10-Year Cohesive Strategy Plan, Healthy Forests Initiative, etc.

Other Collaborative Processes

Some opportunities will result from the Region's public review requirements while others derive from local user groups. This plan will be placed out for public review and input for a thirty day period to ensure local concerns are addressed and any misconceptions related to use of prescribed fire or wildland suppression actions cleared.

Ten Year Comprehensive Strategy Core Principles

Collaboration

For this plan, collaboration at the local level includes: the Missouri Department of Conservation, local municipalities, county conservation agencies, and rural fire departments. In addition, we will ensure effective coordination, interaction, and cooperation with owners of land adjoining Fish and Wildlife Service land.

Priority Setting

Project proposals, primarily related to prescribed fire, will be rated locally for initial priorities. Overall priorities for funding fuel management projects on the complex will be established at the regional level with appropriate input from state and local officials in the immediate area of Fish and Wildlife Service land.

The national, uniform guidance for implementing the provisions of the "Collaborative Fuels Treatment" MOU, and to satisfy the requirements of Task e, Goal 4 of the Implementation Plan for the 10-Year Comprehensive Strategy, establishes broad, nationally compatible standards for identifying and prioritizing communities at risk, while allowing for maximum flexibility at the state and regional level. Three basic premises are:

- Include all lands and all ownerships.
- Use a collaborative process that is consistent with the complexity of land ownership patterns, resource management issues, and the number of interested stakeholders.
- Set priorities by evaluating projects, not by ranking communities.

Accountability

Accountability for achieving objectives developed in this plan will be accomplished by reporting results of projects or activities to the National Fire Plan Operations and Reporting System (NFPORS) as it is implemented. For objectives related to suppression, the annual report of fire activity, available from the Zone Fire Management Officer at Mark Twain National Wildlife Refuge in Quincy, Illinois will document results of suppression or prescribed fire actions taken on the refuge.

References

1. *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment. 10-Year Comprehensive Strategy Implementation Plan.* May 2002. (Goal 4 Task e: "Develop nationally comparable definitions for identifying at-risk wildland urban interface communities and a process for prioritizing communities within state and tribal jurisdiction.") (Available at: http://www.fireplan.gov/reports).
2. *Memorandum of Understanding for the Development of a Collaborative Fuels Treatment Program.* January 13, 2003. (Available at: http://www.fireplan.gov/reports).
3. *Concept Paper: Communities at Risk.* National Association of State Foresters (NASF), December 2, 2002. (Available at: http://www.stateforesters.org/reports).
4. *Wildland/Urban Interface Fire Hazard Assessment Methodology*. NWCG, undated (circa 1997). (Available through the NWCG Publications Management System (PMS), NIFC Catalog number NFES 1597.)

WILDLAND FIRE MANAGEMENT GOALS

Fire Management Goals in Context of Land Management Plan (LMP)

The primary fire management goals on the refuge are to protect public and employee safety from the ravages of wildfire followed by protecting wildlife habitat from degradation as a result of unwanted wildland fire. A secondary goal is the reestablishment of fire as the management tool of choice to maintain and enhance existing fire-adapted communities. Accomplishing the second goal would also reestablish the expected fire regime and maintain affected communities in a Condition Class 1. Tables 1 and 2 explaining fire regimes and condition classes are found under the Fire Management Unit (FMU) descriptions on pages 27 and 28.

General Fire Management Goals

- Firefighter and public safety is the priority of the program. All Fire Management activities will reflect this commitment.
- Protect life, property, and other resources from unplanned fire.
- Use prescribed fire where appropriate to accomplish resource management objectives.
- Restore fire into the ecological process.
- Develop and implement a process to ensure the collection, analysis, and application of fire management information needed to make management decisions.

Fire Management Objectives

- Protect from fire all important scientific, cultural, historic, prehistoric, visitor facilities, and administrative sites.
- Restore and perpetuate habitat important to migratory and native wildlife species, by maintaining a diversity of plant communities in various successional stages.
- Use prescribed fire to restore natural ecological processes, fire regimes, and vegetative communities on the refuge.
- Prevent human-caused wildfires.
- Educate the public regarding the role of prescribed fire within the refuge.
- Maintain and enhance native warm-sesaon grasslands by retarding the invasion of woody species and noxious weeds.
- Use prescribed fire when it is the most effective and efficient means for achieving management objectives.

- Manage the risks associated with hazard fuels. Use prescribed fire near the urban wildland interface, sensitive resources and sensitive boundary areas to reduce risk from wildfire damage.

Fire Management Plan Contribution to Achieve LMP Goals

Effective appropriate management responses, taken quickly, will reduce potentially extensive damage (i.e. loss of preferred vegetation to invasive species or loss of soil organic components, etc.) to Fish and Wildlife Service lands. The application of prescribed fire will safely and effectively work to achieve stated management goals.

Contribution of Wildland Fire Goals to Regional/National Plans

National Fire Plan

Due to the relatively small size of the individual refuge units and lack of fire history since acquisition, wildland fire operations will not contribute significantly to any of the National Fire Plan goals.

Restore Fire-Adapted Communities

Prescribed fire application would be beneficial in restoring the role of fire in maintaining natural habitat conditions. Restoring fire adapted ecosystems is a major emphasis of the refuge's fire management program and further meets fuels management goals while reducing fire danger associated with untreated lands.

Ten Year Comprehensive Strategy

Priorities to Protect Communities and Watersheds

With the conversion from agriculture to a mix of forest, wetlands, and grasslands, an increased risk from wildland fire escaping from Fish and Wildlife Service lands is a possibility and could potentially affect a number of local farmsteads or communities.

Collaboration Among Governments and Representative Stakeholders

Collaboration will occur among state and federal natural resource agencies, local municipalities, rural fire departments, and adjoining landowners to ensure a safe and productive prescribed fire program. We will ensure effective coordination, interaction, and cooperation with owners of land adjoining Fish and Wildlife Service land. Non-governmental conservation organizations will be given the opportunity to review and make input into this plan.

Performance Measures and Results Monitoring

The primary performance measure applicable to the refuge involves effective protection of life and adjacent privately owned property. Proactive use of prescribed fire or management of

hazardous fuels by other means would be utilized. Results would be based on values protected or enhanced. Monitoring would include the change or conversion status of fire regime and condition class (FRCC), prevention success, etc.).

Cohesive Strategy Elements (Draft from USFS accepted by Interior agencies)

Institutional Objectives and Priorities

The refuge's fire management program will emphasize, where possible, the application of prescribed fire to restore and enhance fire-adapted vegetative communities.

Program Management Budgets and Authorities

Fire program management needs are planned for and reported in the FIREBASE fire planning and budgeting software program. FIREBASE is the official fire planning and budgeting program of the U.S. Fish & Wildlife Service. As fuels program projects and habitat restoration occur, the justification for larger allocations of funding is more readily supported thus allowing for the maintenance of these fire adapted ecosystems.

Social Awareness and Support

Fire can play an integral role in outreach through the use of education and demonstration projects. The Region 3 fire program has an outreach coordinator (Lynda Knutsen, Agassiz Refuge) that will be the contact for outreach needs. Additionally, the FWS National Fire Office in Boise, Idaho, has a National Outreach Coordinator on staff that can also assist in these efforts and provide additional educational media. Region 3 also maintains a "Fire Management in the Midwest" website at: http://www.fws.gov/midwest/Fire/ which is an excellent source of pertinent local fire information.

Wildland Urban Interface

Wildland Urban Interface (WUI) is defined as the area where houses meet or intermingle with undeveloped wildland vegetation. This makes the WUI a focal area for human-environment conflicts such as wildland fires, habitat fragmentation, invasive species, and a decline in biodiversity. FIREWISE is an excellent community safety program developed to educate the public about the wildland urban interface and corrective measures needed. Additional examples include working toward a comprehensive social awareness and support system to educate the public concerning the benefits of management ignition in fire adapted ecosystems.

With the population growth towards the country setting the WUI interface is slowly increasing around Fish and Wildlife Service lands. There are several single home and farm facilities located adjacent to or within continuous fuels of complex lands. The fire management program strives to mitigate interface risks with a combination of mechanical fuels treatments and prescribed fire to reduce and eliminate hazard fuel loadings, while creating wide buffers around developed areas and adjacent to private property. Multiple communities in the area of refuge lands were identified as "at-risk" in the wildland urban interface in the Federal Register, Volume 66,

January 4 and August 17, 2001, in the vicinity of federal lands. Several units have been incorporated into the refuge since 2001, so it is likely that the number of "at-risk" communities has increased.

WILDLAND FIRE MANAGEMENT OPTIONS

Wildland Fire Management Options to be Implemented

The refuge will utilize the appropriate management response to suppress all wildland fire in a safe and cost-effective manner consistent with resources and values at risk. Firefighter safety and that of neighbors and visitors is of primary concern. The primary wildfire threats to refuge lands result from agricultural burning, debris burning, railroads and incendiary causes. Smoke management along all roads and highways is the principal safety concern to travelers. Suppression strategies and tactics will be unique to each incident, dependent on safety considerations, weather conditions, costs, fuel conditions, availability of resources, and location of the fire in relation to structures and cultural resource sites. Minimum impact strategies and tactics will be used when appropriate.

The concept of appropriate management response is integral to fire management policy. Management responses are programmed to accept resource management needs and constraints, reflect a commitment to safety, cost effectiveness, and accomplish desired objectives while maintaining the versatility to varying intensity as conditions change. The appropriate management response is defined as the specific actions taken in response to a wildland fire to implement protection and/or fire use objectives. It allows managers to utilize a full range of responses. It does not lock tactical options to fire type designations. As conditions change, the particular response can change to accomplish the same objective.

The appropriate management response is not a replacement term for prescribed natural fire, or the suppression strategies of control, contain, confine, limited or modified, but it is a concept that offers managers a full spectrum of responses. It is based on objectives, environmental and fuel conditions, constraints, safety and ability to accomplish objectives. It includes wildland fire suppression at all levels, including aggressive initial attack. Use of this concept dispels the interpretation that there is only one way to respond to each set of circumstances. The purpose of giving management the ability to select the appropriate management response on every wildland fire is to provide the greatest flexibility possible and to promote opportunities to achieve greater balance in the program.

Use of the Wildland Fire Decision Support Systems. (WFDSS etc.)

Extended attack fire suppression strategy will be determined by preparation of a Wildland Fire Decision Support System (WFDSS) as described in the *Interagency Standards for Fire and Aviation Operations* (NFES 2724). Fire management staff will assist the Line Officer in these requirements.

Rationale for Strategies to be Applied to Each FMU

Generally, most wildfires will use control as the suppression strategy. Wildland Fire Use is not an option. The Wildland Fire Situation Analysis will consist of alternatives based on the management response and appropriate suppression strategy. The three suppression strategies are listed in order of increasing intensity of tactical action:

1. Confine - To restrict the wildfire within determined boundaries, established either prior to or during the fire. These identified boundaries will confine the fire with no direct action being taken to extinguish the fire.

   Tactics include, but are not limited to indirect human-made lines, burning out or backfiring, holding at natural barriers, cold trailing, hose lays and aerial delivery of water or retardant, perimeter mop-up and patrol.

   This strategy may have the least impact from suppression operations but generally involves larger areas and longer incident duration than containment and control.

2. Contain - To restrict a wildfire to a defined area using a combination of natural and constructed barriers that will stop the spread of the fire under the prevailing and forecasted weather conditions until it is out.

   Tactics include, but are not limited to direct and indirect line construction, burning out or backfiring, holding at natural barriers, cold trailing, hose lays and aerial delivery of water or retardant, perimeter mop-up and patrol.

   This strategy utilizes natural barriers to the greatest extent, minimizing suppression impacts from line construction. Areas are generally smaller, incident duration reduced and perimeter secured more quickly as compared with the confinement strategy. Suppression costs will be higher and additional resources will be required to meet tactical needs.

3. Control - To aggressively fight a wildfire through the skillful use of personnel, equipment, and aircraft to establish firelines around a fire, halt the fire's spread, and extinguish all hot spots until the fire is completely out. This strategy is an effective technique to achieve prompt control of a wildfire.

   Tactics are directed at total suppression of the fire as quickly as possible, usually through aggressive direct attack designed to minimize the fire size or area involved.

   Negative resource impacts are potentially the greatest due to the direct tactical control measures employed.

The assigned Incident Commander will determine the appropriate management response, suppression strategy and resulting tactics based on, but not limited to: values at risk; current and

expected weather conditions; current and expected fire behavior; available resources; threats to refuge and non-refuge resources; season of year; and firefighter safety.

Limits to Strategies

Use of foam or retardants will be in accordance with the guidelines found in Appendix B. This will protect sensitive wetlands, water quality, and any fish species present in these wetlands. In addition, mechanized equipment, when used, will be appropriately managed to produce the least environmental damage possible as long as public and firefighter safety are not compromised.

3.2 Description of Wildland Fire Management Strategies by Fire Management Unit

FMU Descriptions

All refuge lands will be treated as one Fire Management Unit. Five possible fuel models exist: Model 2 (Timber – Grass & Understory), Model 3 (Tall Grass), Model 6 (Dormant Brush), Model 8 (Closed Timber Litter), Model 9 (Hardwood Litter), and Model 10 (Timber – Litter & Understory). The relative abundance of current habitat types on the refuge are approximately Bottomland Forest – 60% , Upland Forest -10%, Woodland/Savanna – 10%, and Grasslands (Prairie, Glade, etc.) – 10%. Currently, the refuge is comprised of 10% ruderal/retired agricultural fieds. Topographically the lands involved are generally flat to gently rolling with the exception of some of the upland portions of the refuge that include steeper terrain. Most grassland communites within the refuge would be classified as Fire Regime Group 2 and most upland forests/woodland would be Fire Regime Group 1. Bottomland forests are classified as Fire Regime 3 or 4 and agricultural fields are not considered burnable acres.

Table 1 – Fire Regime Groups

Fire Regime Group	Frequency (Fire Return Interval)	Severity
I	0-35 years	low severity
II	0-35 years	stand replacement severity
III	35-100+ year	mixed severity
IV	35-100+ year	stand replacement severity
V	>200 years	stand replacement severity

Additional physical and biological descriptive information for the refuge is found in Appendix D.

The refuge is a combination of Condition Class 2 and 3 lands, as defined in Table 2. Lightning was historically the principal natural cause of wildfire but realistically was a distant secondary

event as compared to wildfire started by Native Americans.[1] Pre-settlement fire occurrence was most likely to have been anthropogenic in nature. Fire occurrence today is typically the result of careless activity by the public.

Table 2 – Condition Class Explanation

Condition Class	Fire Regime Example Management Options
Condition Class 1	Fire regimes are within an historical range and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within an historical range. Where appropriate, these areas can be maintained within the historical fire regime by treatments such as fire use.
Condition Class 2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased). This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Where appropriate, these areas may need moderate levels of restoration treatments, such as fire use and hand or mechanical treatments, to be restored to the historical fire regime.
Condition Class 3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Where appropriate, these areas may need high levels of restoration treatments, such as hand or mechanical treatments, before fire can be used to restore the historical fire regime.

FMU Objectives, Standards, Guidelines or Desired Future Condition with Strategies

The primary fire management objective for this FMU is the protection of adjacent private property from wildland fire. Wildland fire suppression is the strategy to be applied. As needs are evaluated and funding becomes available, proactive reduction of hazardous fuels will supplement suppression actions. As additional lands are added, complexity will increase.

As agricultural fields are restored to native species, prescribed fire will play an increasingly larger role in the restoration and maintenance of these refuge lands. Waterfowl and migratory

[1] Fire and Other Factors Controlling The Big Woods Vegetation of Minnesota in the Mid-Nineteenth Century; Eric C. Grimm, 1983, Department of Ecology and Behavioral Biology, University of Minnesota

birds will immediately benefit from these habitat improvements. Prescribed fire application will be accomplished using standards described in the FWS Fire Management Handbook Chapter 2.

4. WILDLAND FIRE MANAGEMENT COMPONENTS

4.1 WILDLAND FIRE SUPPRESSION

Program Direction

The refuge manager at Big Muddy NFWR, with oversight from the Zone Fire Management Officer located at Mark Twain NWR Complex headquarters in Quincy, Illinois, directs fire operation on all lands managed by the refuge.

The refuge is located along the lower Missouri River with refuge headquarters in Columbia, MO. See the attached location maps (Figures 1 - 10) for a more detailed description. Initial attack suppression action will be provided by Big Muddy NFWR and local rural fire departments.

The primary objective in any suppression action will be the provision for firefighter safety and safety of refuge visitors, cooperators, and the public. The refuge will utilize the appropriate management response to suppress all wildland fire occurring on Fish and Wildlife Service lands. Additional objectives include the prevention of fires burning off of the refuge onto adjacent lands and minimizing damage to Fish and Wildlife Service resources from wildfire or suppression efforts.

Suppression Strategies and Techniques

1. Utilize existing roads and trails, bodies of water, areas of sparse or non-continuous fuels as primary control lines, anchor points, escape routes, and safety zones.

2. When appropriate, conduct backfiring operations from existing roads and natural barriers to halt the spread of fire.

3. If the use of heavy equipment is warranted, construction of control lines will border existing roads where possible.

4. Retardants may be used on upland areas and as defined in Appendix B.

5. The IC will choose the appropriate suppression strategy and technique. As a guide: On low intensity fires (generally flame lengths less than 4 feet) the primary suppression strategy will be direct attack with hand crews and engines. If conditions occur that sustain higher intensity fires (those with flame lengths greater than 4 feet) then indirect strategies which utilize back fires or burning out from natural and human-made fire barriers may be utilized. Those barriers should be selected to safely suppress the fire, minimize resource degradation and damage, and be cost effective.

Fish and Wildlife Service policy requires the refuge to utilize the Incident Command System (ICS) and firefighters meeting NWCG qualifications for fires occurring on Fish and Wildlife Service property. All suppression efforts will be directed toward safeguarding life while protecting the complex's resources and property from harm. Mutual aid resources responding from cooperating agencies will not be required to meet NWCG standards, but must meet the standards of their respective Agency. Mutual aid resources will report to the IC (in person or by radio) and receive their duty assignment. Mutual aid forces will be first priority for release from the fire. If additional firefighters are needed, appropriate procedures will be used to acquire them.

Preparedness

Prevention and Community Education

Although fire may have historically played a role in the development of habitats on the refuge, human-ignited fires and natural ignitions burning without a prescription are likely to result in unwanted damage to cultural and/or natural resources. In order to prevent wildfire, an educational program will be utilized to reduce the threat of human-caused fires. Prevention and community education will be coordinated with the state and federal natural resource agencies, county conservation agencies, and rural fire departments. Ongoing monitoring will be conducted by Fish and Wildlife Service staff, visitors, and cooperators to detect fire ignitions. Actions taken to implement this include:

1. All staff members will be familiar with this plan. New employees and volunteers will be given an orientation session which includes discussion of fire prevention and detection.

2. Fire prevention will be discussed at safety meetings, prior to the fire season, and during periods of high fire danger. Periodic training of staff in regard to fire prevention will be conducted.

3. During periods of high fire danger, warnings will be posted at visitor information stations.

4. Public contacts will be made via press releases and verbal contacts during periods of high fire danger.

5. A thorough investigation will be conducted of all fires suspected to have been intentionally set. Upon completion of the investigation, appropriate action will be taken

Community Assistance and Grant Programs

When additional lands are purchased or acquired, consideration will be given to providing local fire departments access to both Rural Fire Assistance and grant programs.

Training and Qualifications

Departmental and FWS policy requires that all personnel engaged in suppression and prescribed fire duties meet the standards set by the National Wildfire Coordinating Group (NWCG) within publication PMS 310-1. As suppression will be supplemented by the state and/or local fire departments, their qualification requirements will be accepted in accordance with existing national level agreements/guidance.

All personnel involved in fire management functions will be provided with the training required to meet FWS qualification standards for the position they are expected to perform. Interagency training opportunities will be utilized whenever possible.
The Regional Office will pay for all approved fire training if the following criteria are met:

1. Participant completes and submits to the Zone FMO a National Wildfire Coordinating Group Interagency Training Nomination form (NFES 2131), complete with supervisory approval and an estimated cost of training, travel, and per diem prior to the commencement of training.

2. The training is approved by the Zone Fire Management Officer.

3. Upon completion of the training, a copy of the Certificate of Completion and a copy of the travel voucher are sent to the Budget Assistant for Refuges and Wildlife in the Regional Office and Zone FMO in Quincy, IL.

Readiness

Big Muddy NFWR will have primary suppression responsibilities for refuge lands. Assistance for suppression activities may also be provided by the staff from other refuges. Additional suppression assistance may also be furnished by local fire departments. Suppression on the remainder of the refuge will be carried out by local rural fire departments.

Detection

With the proximity of adjacent landowners and public access, detection is expected to be by means of public contact with appropriate authorities. Much of Missouri consists of fire-adapted communites where fire has historically played an integral role. Therefore, fire preparedness will entail providing additional detection during extreme fire danger or in the event of a local arson problem.

Initial Attack

Initial attack operations would be provided by the fire staff from Big Muddy NFWR with additional assistance provided by other refuges and local rural fire departments. Refuge lands may present some initial attack difficulties depending upon where on the refuge fire may break out due to wetlands, drainage ditches, impoundments, etc. However, those structures such as levees, roads and cultivated lands can also assist with fire control by providing fire and fuel breaks to stop and prevent fire spread.

Extended Attack

With the relatively small size of the existing parcels, it is not likely that active suppression operations would exceed the initial burning period. Second burning period operations would generally be mop-up operations.

Other Management Considerations

Clean Air Act

The areas surrounding complex lands are Class II air quality areas. No Class I areas such as federal wilderness or national parks are present. Wildland fires are expected to be of short duration with minimal effects on long-term air quality. Prescribed fire use on the complex will not reduce air quality and will meet all current air quality standards.

Endangered Species Act

The lower Missouri River provides habitat for six federally endangered species (See Appendices H and Q). They include the Interior Least Tern, Piping Plover, Gray Bat, Indiana Bat, Pallid Sturgeon, and Decurrent False Aster. Neither the Gray Bat, Indiana Bat, nor Decurrent False Aster has been found on Big Muddy NFWR.

The three federally listed threatened or endangered species that are known to occur on the refuge include the Least Tern, Piping Plover, and Pallid Sturgeon. All three of these species are asscociated with riverine or floodplain habitat and would not be directly affected by fire activities. Least Terns and Piping Plovers utilize emergent sandbar habitat as nesting sites when river levels drop and expose portions of the floodplain. Pallid Sturgeon are a fish species endemic to the Missouri and lower Mississippi Rivers. Pallid Sturgeon relies on slow-moving side channels of the river for spawning grounds.

Other species of concern include FWS Region 3 Conservation Priority Species (See Appendix H).

Other Legislation or Codified Rules

Should suppression operations uncover sites with potential, FWS personnel will be notified and the regional direction for cultural resource protection, found in Appendix A, will be followed.

4.1 A WILDLAND FIRE USE

Wildland fire use (also referred to as *fire use and most recently as Appropriate Management Response*) is the management of unplanned wildland fires, such as lightning-ignited fires, to

accomplish specific resource management objectives. Lightning-caused wildland fires will receive appropriate management responses that give consideration to values, hazards, and risks.

There is no planned wildland fire use on the refuge at this time. In the event that this would change, a Wildland Fire Use Management Plan would need to be developed and approved. All wildfires will be extinguished.

Fire use projects can be a preferred means of achieving resource management objectives in the zones and FMU's where restoration and ecological values dominate considerations. As conditions may change in the future, Wildland Fire Use remains a viable fire management option.

4.1 B PRESCRIBED FIRE

Long-Term Program Objectives

The two primary program objectives of prescribed fire use will be the reduction of hazardous fuels and the restoration of the native ecosystem. As land management objectives proceed, prescribed fire will be an increasingly more important and necessary tool to achieve habitat restoration objectives.

Annual Preparation

Planning for each burn season begins the year prior to that season. Prescribed fire projects will be planned by the refuge staff with assistance from the Zone FMO based on the goals and objectives in this plan and the land management objectives. Budget requests will be prepared and submitted, by assigned deadlines, into FIREBASE. The Prescribed Burn Boss will conduct a field reconnaissance of the proposed burn location with the appropriate staff time permitting to discuss objectives, special concerns, and gather all necessary information to write the burn plan. After completing the reconnaissance, a Prescribed Burn Boss qualified at the expected level of complexity will write the prescribed burn plan. Both neighbors and cooperators will have opportunities for input into the planning process. The finalized burn schedule will be submitted to the Zone FMO for review.

Required Staffing

Personnel needed to conduct prescribed fires on the refuge will consist primarily of the Fish and Wildlife Service fire staff and qualified non-fire staff. The refuge will maintain a cadre of staff qualified at the Firefighter Type 2 (FFT2) level or higher. The Prescribed Burn Boss will be qualified at the Prescribed Burn Boss 3 (RXB3) or RXB2 as needed. Supplemental resources provided by other Fish and Wildlife Service stations will generally be required during peak burn windows due to the necessity of covering multiple program areas at the same time.

As part of the planning process, the prescribed fire burn boss will determine for each individual burn, the numbers and types of positions required. Depending on qualifications and the nature of

current and future cooperative agreements or MOUs, both state agency and local fire department personnel may be participants.

In addition, The Nature Conservancy, Missouri Department of Conservation, volunteers, and casual hires may provide personnel to assist with prescribed fire operations when they possess the required training and qualifications.

A listing of current employee qualifications is contained in Table 4 of Appendix K.

Sensitive Resource Considerations

The reconnaissance conducted as part of the planning process will identify potential cultural sites and they will be surveyed in accordance with Regional Office guidance found in Appendix A. Some federally or State listed threatened or endangered species (T&E) described earlier are likely to be found on the complex. Should the pre-burn reconnaissance indicate T&E presence, an intra-Service Section 7 consultation will be initiated. Efforts will be made to determine fire effects on any T&E species present using literature searches, biological consultation and review of existing on-line databases. Lists of Federal and state T&E species potentially present are found in Appendix H.

Prescription Requirements

Prescription elements in each individual prescribed fire plan should describe in detail the acceptable ranges of fire behavior and parameters of weather and fuel moisture content or other site variables. Smoke management requirements including duration of production and dispersal patterns are also required. The use of fire behavior and smoke management prediction aids (e.g., BEHAVE, RXWINDOWS, nomograms, SASEM) is recommended. Measures of desired results should also be included, i.e. percent of litter removed, number of brush stems killed, season of burns, etc.

Prescribed Fire Plan Elements

The prescribed fire plan is a site specific action plan describing the purpose, objectives, prescription, and operational procedures needed to prepare and safely conduct the burn. The treatment area, objectives, constraints, and alternatives will be clearly outlined. No burn will be ignited unless all prescription parameters of the plan are met. Fires not within those parameters will be suppressed. As part of the plan, minimum contingency resources will be listed. Prescribed Fire Plans will follow the format contained in the Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide (September 2006). This format is reproduced in Appendix C. Each burn plan will be reviewed by the Zone FMO. The Project Leader has the final authority to approve the burn plan. The term burn unit refers to a specific tract of land to which a prescribed burn plan applies.

Documentation and Reporting

Reporting

The prescribed fire burn boss is responsible for compiling the necessary information regarding a prescribed fire required for the Fire Management Information System (FMIS) report and communicating it to the appropriate refuge staff. Refuge staff are responsible for entering the data into the FMIS computer database. The report should be completed within ten days after the fire is declared out. Information is transmitted to the Zone WUI Specialist for input into the National Fire Plan Operations and Reporting System (NFPORS), and the Zone FMO for tracking purposes.

Effects Monitoring

Monitoring of prescribed fires is intended to provide information for quantifying and predicting fire behavior and its ecological effects on refuge resources while building a historical record. Monitoring measures the parameters common to all fires: fuels, topography, weather and observed fire behavior. Operational monitoring provides a check to insure that the fire remains in prescription and serves as a basis for evaluation and comparison of management actions in response to measured, changing fire conditions, and changes such as fuel conditions and species composition. At a minimum, monitoring should include before and after burn photo documentation from fixed points.

Cost Accounting

All costs of planning, implementation, and first order post-fire monitoring will be charged to the appropriate cost code. This data may be tracked in several locations including FMIS and NFPORS, as well as the Federal Financial System. Detailed cost tracking provides for constantly improving cost estimates for budget purposes.

Public Information/Interaction

Informing the public of our need to use prescribed fire as a management tool is vital to the refuge's fire management program. In order to garner support and improve the efficiency of the prescribed fire program, it is necessary to insure that the surrounding public is well informed as to the purposes of prescribed fire activities. Prior to and throughout the course of each burn season, the public will be informed of prescribed fire activity on the refuge through several methods including: press releases; information bulletins posted at information kiosks; and smoke signs and traffic control devices. On days when burning will be conducted, residents adjacent to or within possible smoke impacted areas, will be contacted as specified in the burn plan for that particular unit. County dispatch will also be notified of the location and proposed ignition time of each unit. This will allow them to inform local rural fire departments of planned refuge fire activity and respond to calls from the public.

4.2 MECHANICAL FUEL TREATMENTS

Mechanical fuel reduction is the use of mechanical equipment (i.e. weed whackers, chainsaws, dozers, rubber tired skidders, chippers, mowers, etc.) to cut and remove, or prepare for burning, woody fuels. Mechanical treatments are intended to help in achieving resource management goals and objectives, most often a combination of ecosystem restoration and reduction of high hazard fuel loadings. Mechanical fuel treatments must be described in a fuels project plan. The plan will contain a prescription defining goals, objectives, and treatment methods employed to achieve the objectives.

Mechanical fuel treatment is often used in concert with prescribed fire treatment. High hazard fuel conditions can be reduced while meeting structural objectives in areas immediately adjacent to infrastructure values (Wildland Urban Interface) or on boundary areas through a mix of mechanical treatment and prescribed fire. Mechanical treatment can be used as the primary method of reaching structural goals while prescribed fire actually removes and eliminates the hazardous fuels.

Long-Term Program Objectives

The primary program objective is the reduction of hazardous fuels to protect adjacent landowners and values at risk. As regeneration of agricultural areas continues, annual reviews will be conducted to determine necessity of treatment.

Annual Preparation

There is little preparation needed for mechanical treatments. Review of proposed projects to ensure that damage would be minimal will be part of the planning process. What can be critical is the timing of the mechanical treatment to ensure that soil compaction and disturbance does not occur during wet season or times of high precipitation. Conducting mechanical treatments during frozen ground conditions or late in the growing season tend to yield the best results.

Required Staffing

The required number of personnel will be used to meet the provisions of the work plan.

Sensitive Resource Considerations

Depending on the type of mechanical operation, (disking, mowing, etc.), ground disturbance may occur. Mowing does not disturb the ground so no effects are expected on potential, undiscovered, cultural sites.

Federally or State listed threatened or endangered species could be found on the refuge. Should reconnaissance prior to treatment indicate T&E presence, an intra-Service Section 7 consultation will be initiated. Depending on access conditions, mechanical treatments can usually be timed to mitigate adverse effects on listed species. Lists of Federal and state T&E species potentially present are found in Appendix G.

Air quality is not expected to be affected by mechanical fuels treatments. Some fugitive dust may be generated over the immediate area. It is not expected to be of a quantity or duration to contribute to regional haze conditions.

Restrictions

Equipment

There are no restrictions on types of equipment that may be used. Common agricultural equipment and implements would generally be used in fuel management operations.

Seasonal

Depending on the season and precipitation levels, operations would be timed to reduce potential for ground disturbance. The only other seasonal restriction involves delay of operations until ground nesting is essentially complete.

Documentation and Reporting

Reporting

The project manager is responsible for compiling the necessary information regarding a mechanical treatment required for the Fire Management Information System (FMIS) report and communicating it to the appropriate staff. Refuge staff are responsible for entering the data into the FMIS computer database. The report should be completed within ten days after the treatment is completed. Information is transmitted to the Zone WUI Specialist for input into the NFPORS, and the Zone FMO for tracking purposes.

Effects Monitoring

Monitoring of mechanical operations is intended to provide information for quantifying and predicting ecological effects on refuge resources while building a historical record. In addition, ecological changes such as species composition and structural changes in vegetation should be monitored after each operation. Operational monitoring provides a basis for evaluation and comparison of management actions.

Cost Accounting

All costs of planning, implementation and first order, post-operation, monitoring will be charged to the appropriate cost code. This data may be tracked in several locations including FMIS, the National Fire Plan Operations and Reporting System (NFPORS) as well as the Federal Financial System. Detailed cost tracking provides for constantly improving cost estimates for budget purposes.

Public Information/Interaction

As needed, opportunities for public input should be made available to reduce public concern about increases in fuels, potential use of fire for management and potential for mechanical treatment of fuels.

4.3 EMERGENCY REHABILITATION AND RESTORATION

Burned Area Emergency Stabilization and Rehabilitation Handbook

While wildland fire may occur on the refuge, the flat to rolling topography is not likely to require stabilization or rehabilitation. There is potential for damage to access roads during suppression operations. These needs would be addressed during or immediately following suppression operations. All other rehabilitation needs would be addressed following the guidance found in the Burned Area Emergency Stabilization and Rehabilitation Handbook.

4.4 ORGANIZATION AND BUDGET

STAFFING

Current Level

The Project Leader at Big Muddy NFWR has immediate oversight for all fire operations on lands managed by the refuge. The Zone Fire Management Officer (ZFMO) located at the Mark Twain NWR Complex headquarters in Quincy, Illinois, provides fire management oversight as needed. The appropriate refuge staff will provide fire management expertise for day to day operations and provide input for short and long-term planning of fire projects. Non-fire staff will participate in fire related refuge activities as necessary.

Level Needed to Achieve Fire Management Goals

Due to the small staff at the Big Muddy NFWR and the need to manage fire operations on the entire refuge, additional staffing will generally need to be brought in on a short-term basis to accomplish identified targets. Staff borrowed from other stations for prescribed and wildfire operations should be adequate to accomplish stated objectives. Within the requested resource order at least one individual qualified at the Prescribed Fire Burn Boss Type 2 (RXB2) and Incident Commander Type 4 (ICT4), or higher, level should be included. It will also be possible to work cooperatively with trained, experienced Missouri Department of Conservation staff to complete prescribed burn projects. Mechanical operations will generally utilize Fish and Wildlife Service staff depending on location. Some mechanical operations may be accomplished under contract and would require contract administration to ensure that requirements and project objectives were being met.

FUNDING

Current Level

Currently there are no funded positions for permanent full-time (PFT) fire staff. Refuge staff will work on prescribed fire activities on a seasonal and part-time basis.

Additional Support

Additional support will be requested as needed when projects are identified or when extreme fire weather or changing conditions warrant additional resources. Severity funding may be essential to provide adequate fire protection for the Refuge during periods of drought, as defined by the Palmer Drought Index, Keetch-Byram Drought Index, precipitation departure from normal, or other appropriate drought indicator. Severity funds may be used to hire additional firefighters, extend firefighter seasons, or to provide additional resources. The FWS Fire Management Handbook provides guidelines for use of severity funding.

To achieve wildland fire management goals, especially prescribed fire application, additional funding for contract services, or to pay salary and travel costs of FWS employees would be necessary. Under current conditions, needed project funding can be requested through FIREBASE.

Current refuge staff will provide local fire management expertise, so no additional staffing will need to be brought in to accomplish any identified fire management project work. Staff borrowed from other stations for prescribed fire operations should be adequate to accomplish stated objectives. It is also acceptable to work cooperatively with trained, experienced staff from the Missouri Department of Conservation to complete prescribed fire operations. Most mechanical operations would be accomplished under contract and would require contract administration to ensure that requirements and project objectives were being met.

COOPERATIVE AGREEMENTS

Current agreements exist for fire suppression with the Arrow Rock Community VFD, Chamois FPD, Cooper County FPD, Howard County FPD, Malta Bend Fire Department, Monarch FPD, Orrick FPD, and Waverly RFD. Other cooperative suppression agreements will be pursued with local fire departments and agencies with fire fighting capabilities and resources to better protect complex lands and provide for employee and visitor safety. This may help to minimize environmental impacts associated with suppression efforts. MOU's with local fire departments will address cooperative fire management efforts such as suppression.

5.0 MONITORING AND EVALUATION

MONITORING

Prescribed Fire

Minimum Levels

At a minimum, permanent photo points should be installed and documented. Before and after photos will document the overall visual changes following prescribed fire operations. Future possibilities also include the use of annual infrared aerial photography to document and record vegetation changes over time due to the use of prescribed fire.

Intermediate Levels (example: NPS Fire Monitoring Handbook, 2001)

The National Park Service Fire Monitoring Handbook provides a reference to follow for monitoring guidance prior to the planned development of a Region 3 Fuel and Fire Effects Monitoring Handbook or Field Guide. Monitoring at levels 1 and 2 is preferred as a minimum level. A full PDF file version of the NPS Monitoring Handbook may be downloaded from the internet or a hardcopy may be obtained by contacting the National Park Service National Fire Office in Boise, ID.

Maximum Levels

If and when it becomes feasible, fire monitoring should become part of a comprehensive refuge monitoring program. All monitoring, (i.e. species surveys, water level monitoring, vegetation changes, fire effects, etc.) would be integrated into one program supporting adaptive management. The current FWS Promises Team efforts in this arena are addressing these needs. Specifically, the Wildlife and Habitat Promises Team recommendations are, WH8: Develop refuge inventory and monitoring plans for species, WH9: Design or use existing databases to analyze and archive information, and WH10: Develop systematic habitat monitoring programs that directly meet these integrated fire management needs.

Non-Fire Treatments

Minimum Levels

As a minimum, permanent photo points should be installed and documented. Before and after photos will document the overall visual changes following mechanical operations.

Volume/Weight Removed Measures

At a higher level, information about the volume or weight of biomass removed is valuable to quantify treatment effects. Records of biomass removal are valuable for tracking ecosystem management.

EVALUATION

Wildland Fire Suppression Operations

Review of Outside Resource Performance

Evaluation of outside resources (state agencies, other overhead or resources) will occur in accordance with guidance in the Fire Management Handbook, Section 3.6, Reviews.

Review of Internal Refuge Actions

Evaluation of refuge suppression actions, if any, will be handled the same as the review of outside resource performance. The guidance found in the Fire Management Handbook, Section 3.6, Reviews, will be followed.

Effectiveness of Prescribed Fire Operations

The effectiveness of prescribed fire operations will be judged using the monitoring results developed in the section on monitoring above.

NATIONAL WILDLAND FIRE PERFORMANCE MEASURES

Projects or activities that relate to the National Fire Plan would be entered into NFPORS and reported through that system. It is expected that pre-settlement, Fire Regime I, probably with most ignitions anthropogenic in nature, existed. The current condition class of the refuge was estimated as a combination of Condition Classes 1, 2, and 3.

5.1 Fire Effects Monitoring

5.2 Climate Change within Region 3

Climate Change has begun to influence the severity, frequency and magnitude of wildfires in many Regions of the United States (Miller et al. 2009). In the Midwest Region, climate change has increased biological variability with increasing changes occurring in plant and ecosystem range and biome distribution (Frelich, Reich 2010). Documented movement northward of southern mammal species has been recorded from research studies (Meyer, 2009).These changes have also been documented at the broadest continental and regional scales with greater uncertainty at finer scales. The Midwest Region Fire Management Program will follow National and Regional Service guidance on Climate Change. Adaptive management will increasingly become more important to assess climate change effects on management activity outcomes. Refuge and Wetland Management District fire programs will continue to conduct fire effects monitoring and to incorporate scientific research into future management actions in the face of Climate change.

APPENDICES

Appendix A: Regional Requirements for NHPA

Preparation for prescribed fires such as constructing fire lines are subject to Section 106 of the National Historic Preservation Act. The procedures in the Notice dated December 8, 1999, "Historic Preservation Responsibilities," apply to the planning and preparation for conducting prescribed fires.

Efforts to control wildland fires (including prescribed fires that get out of control) are also subject to Section 106 of the National Historic Preservation Act. We will meet our obligations under this act in the following ways:

When the land covered by a wildfire has been inventoried to identify cultural resources, and the cultural resources have been evaluated for significance according to the criteria for the National Register of Historic Places, the Fire Management Officer will direct ground disturbing fire suppression efforts around (will avoid impacting) historic properties. Nevertheless, evidence of a previously undetected cultural resource may be encountered. The project leader shall immediately notify the Regional Historic Preservation Officer (RHPO). The RHPO will take immediate steps to have the cultural resource evaluated and protected, as appropriate, to the extent required by law and policy. This may require arranging for a qualified professional to visit and evaluate the site's importance and recommend a course of action. An evaluation and decision on the disposition of the cultural resource should be made within 48 hours of the discovery unless the project's schedule allows greater flexibility.

When the land covered by a wildfire has not been inventoried for cultural resources and wildfire suppression activities do result in ground disturbing activities, we will take the following action. Soon after fire control, the project leader will contact the RHPO to arrange for an archeologist to investigate the disturbed areas to determine if sites were affected.

Emergency archeological and historic property surveys in unstable areas prone to further degradation (i.e., erosion) following a wildland fire or in association with an emergency fire rehabilitation treatment, and archeological, historic structure, cultural landscape, and traditional cultural property resource stabilization and rehabilitation can be funded with emergency rehabilitation funding (sub-activity 9262).

Appendix B: Environmental Guidelines for Foam/Retardant Use

The following guidelines should be followed to minimize the likelihood of retardant chemicals entering a stream or other body of water.

- During training or briefings, inform field personnel of the potential danger of fire chemicals, especially foam concentrates, in streams or lakes.
- Locate mixing and loading points where contamination of natural water, especially with the foam concentrate, is minimal.
- Maintain all equipment and use check valves where appropriate to prevent release of foam concentrate into any body of water.
- Exercise particular caution when using any fire chemical in watersheds where fish hatcheries are located.
- Locate dip operations to avoid run-off of contaminated water back into the stream.
- Dip from a tank rather than directly from a body of water, to avoid releasing any foam into these especially sensitive areas.
- Use a pump system equipped with check valves to prevent flow of any contaminated water back into the main body of water.
- Avoid direct drops of retardant or foam into rivers, streams, lakes, or along shores. Use alternative methods of fire line building in sensitive areas.
- Notify proper authorities promptly if any fire chemical is used in an area where there is likelihood of negative impacts.
- While it is preferable that drops into or along any body of water not occur, it is possible that the fire location and surrounding terrain make it probable that some retardant may enter the water. The person requesting the retardant (such as the incident commander) must balance the impacts on the environment, i.e., potential fish kill, with the resources and values to be protected from the fire.

Appendix C: Prescribed Fire Documents

Prescribed Fire Plan Format

Cover Page

A standardized, reproducible template form for the Prescribed Fire Plan development process is included in this appendix. A standardized format is provided for the Prescribed Fire Plan in PDF. An electronic version editable in Word is also available. Users should prepare the plan using the electronic version.

In the electronic Word version, the Project Name and/or Unit Name should be entered in the document's header which will automatically appear on each following page of the plan.

A standardized, reproducible template form for the Prescribed Fire Plan development process is included in this appendix. A standardized format is provided for the Prescribed Fire Plan in PDF. An electronic version editable in Word is also available. Users should prepare the plan using the electronic version.

In the electronic Word version, the Project Name and/or Unit Name should be entered in the document's header which will automatically appear on each following page of the plan.

To insert information into the document's header:

1. Double-click in the header region (upper region of each page displayed on the screen).
2. Type Project and/or Unit information.
3. Double-click *outside* the header region in the body of the document.

You may also access the header under **View** > **Headers and Footers**. This will open the header region for edits automatically. After entering the information, go again to **View** > **Headers and Footers** which will return you to being able to enter information into the body of the document.

PRESCRIBED FIRE PLAN

ADMINISTRATIVE UNITS(S): _____

MANAGING UNIT(S): _____

PRESCRIBED FIRE NAME: _____

PREPARED BY: _____ DATE: _____
Name and Qualification

TECHNICAL REVIEW BY: _____ DATE: _____
Name and Qualification

COMPLEXITY RATING: _____

APPROVED BY: _____ DATE: _____
Agency Administrator

ELEMENT 2: AGENCY ADMINISTRATOR PRE-IGNITION APPROVAL CHECKLIST

Instructions: The Agency Administrator's Pre-Ignition Approval is the intermediate planning review process (i.e. between the Prescribed Fire Complexity Rating System Guide and Go/No-Go Checklist) that should be completed before a prescribed fire can be implemented. The Agency Administrator's Pre-Ignition Approval evaluates whether compliance requirements, Prescribed Fire Plan elements, and internal and external notifications have been or will be completed and expresses the Agency Administrator's intent to implement the Prescribed Fire Plan. If ignition of the prescribed fire is not initiated prior to expiration date determined by the Agency Administrator, a new approval will be required.

YES	NO	KEY ELEMENT QUESTIONS
		Is the Prescribed Fire Plan up to date? *Hints: amendments, seasonality.*
		Will all compliance requirements be completed? *Hints: cultural, threatened and endangered species, smoke management, NEPA.*
		Is risk management in place and the residual risk acceptable? *Hints: Prescribed Fire Complexity Rating Guide completed with rational and mitigation measures identified and documented?*
		Will all elements of the Prescribed Fire Plan be met? *Hints: Preparation work, mitigation, weather, organization, prescription, contingency resources*
		Will all internal and external notifications and media releases be completed? *Hints: Preparedness level restrictions*
		Will key agency staff be fully briefed and understand prescribed fire implementation?
		Are there any other extenuating circumstances that would preclude the successful implementation of the plan?
		Have you determined if and when you are to be notified that contingency actions are being taken? Will this be communicated to the Burn Boss?
		Other:

Recommended by: _____ Date: _____
FMO/Prescribed Fire Burn Boss

Approved by: _____ Date: _____
Agency Administrator

Approval expires (date): _____

ELEMENT 2: PRESCRIBED FIRE GO/NO-GO CHECKLIST

	YES	NO
A. Has the burn unit experienced unusual drought conditions or contain above normal fuel loadings which were not considered in the prescription development? If NO proceed with checklist., if YES go to item B.		
B. If YES have appropriate changes been made to the Ignition and Holding plan and the Mop Up and Patrol Plans? If YES proceed with checklist below, if NO STOP.		

YES	NO	QUESTIONS
		Are ALL fire prescription elements met?
		Are ALL smoke management specifications met?
		Has ALL required current and projected fire weather forecast been obtained and are they favorable?
		Are ALL planned operations personnel and equipment on-site, available, and operational?
		Has the availability of ALL contingency resources been checked, and are they available?
		Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?
		Have all the pre-burn considerations identified in the Prescribed Fire Plan been completed or addressed?
		Have ALL the required notifications been made?
		Are ALL permits and clearances obtained?
		In your opinion, can the burn be carried out according to the Prescribed Fire Plan and will it meet the planned objective?

If all the questions were answered "YES" proceed with a test fire. Document the current conditions, location, and results

_____ _____

Burn Boss Date

ELEMENT 3 COMPLEXITY ANALYSIS SUMMARY

PRESCRIBED FIRE NAME			
ELEMENT	**RISK**	**POTENTIAL CONSEQUENCE**	**TECHNICAL DIFFICULTY**
1. Potential for escape			
2. The number and dependence of activities			
3. Off-site Values			
4 On-Site Values			
5. Fire Behavior			
6. Management organization			
7. Public and political interest			
8. Fire Treatment objectives			
9 Constraints			
10 Safety			
11. Ignition procedures/ methods			
12. Interagency coordination			
13. Project logistics			
14 Smoke management			

COMPLEXITY RATING SUMMARY	
	OVERALL RATING
RISK	
CONSEQUENCES	
TECHNICAL DIFFICULTY	
SUMMARY COMPLEXITY DETERMINATION	
RATIONALE:	

ELEMENT 4: DESCRIPTION OF PRESCRIBED FIRE AREA

A. Physical Description

1. Location**:**
2. Size:
3. Topography:
4. Project Boundary:

B. Vegetation/Fuels Description:

1. On-site fuels data
2. Adjacent fuels data

C. Description of Unique Features:

ELEMENT 5: GOALS AND OBJECTIVES

A. Goals:

B. Objectives:

1. Resource objectives:
2. Prescribed fire objectives:

ELEMENT 6: FUNDING:

A. Cost:

B. Funding source:

ELEMENT 7: PRESCRIPTION

A. Environmental Prescription:

B. Fire Behavior Prescription:

ELEMENT 8: SCHEDULING

A. Ignition Time Frames/Season(s):

B. Projected Duration:

C. Constraints:

ELEMENT 9: PRE-BURN CONSIDERATIONS

A. Considerations:

1. On Site:

2. Off Site

B. Method and Frequency for Obtaining Weather and Smoke Management Forecast(s):

C. Notifications:

ELEMENT 10: BRIEFING

Briefing Checklist:

- ☐ Burn Organization
- ☐ Burn Objectives
- ☐ Description of Burn Area
- ☐ Expected Weather & Fire Behavior
- ☐ Communications
- ☐ Ignition plan
- ☐ Holding Plan
- ☐ Contingency Plan
- ☐ Wildfire Conversion
- ☐ Safety

ELEMENT 11: ORGANIZATION AND EQUIPMENT

A. Positions:

B. Equipment:

C. Supplies:

ELEMENT 12: COMMUNICATION

A. Radio Frequencies

1. Command Frequency(s):
2. Tactical Frequency(s):
3. Air Operations Frequency(s):

B. Telephone Numbers:

ELEMENT 13: PUBLIC AND PERSONNEL SAFETY, MEDICAL

A. Safety Hazards:

B. Measures Taken to Reduce the Hazards:

C. Emergency Medical Procedures:

D. Emergency Evacuation Methods:

E. Emergency facilities:

ELEMENT 14 TEST FIRE

A. Planned location:

B. Test Fire Documentation:

1. Weather conditions On-Site:
2. Test Fire Results:

ELEMENT 15: IGNITION PLAN

A. Firing Methods:

B. Devices:

C. Techniques:

D. Sequences:

E. Patterns:

F. Ignition Staffing:

ELEMENT 16: HOLDING PLAN

A. General Procedures for Holding:

B. Critical Holding Points and Actions:

C. Minimum Organization or Capabilities Needed:

ELEMENT 17: CONTINGENCY PLAN

A. Trigger Points:

B. Actions Needed:

C. Additional Resources and Maximum Response Time(s):

ELEMENT 18: WILDFIRE CONVERSION

A. Wildfire Declared By:

B. IC Assignment:

C. Notifications:

D. Extended Attack Actions and Opportunities to Aid in Fire Suppression:

ELEMENT 19: SMOKE MANAGEMENT AND AIR QUALITY

A. Compliance:

B. Permits to be Obtained:

C. Smoke Sensitive Areas/Receptors:

D. Impacted Areas:

E. Mitigation Strategies and Techniques to Reduce Smoke Impacts:

ELEMENT 20: MONITORING

A. Fuels Information (forecast and observed) Required and Procedures:

B. Weather Monitoring Required and Procedures:

C. Fire Behavior Monitoring Required and Procedures:

D. Monitoring Required To Ensure That Prescribed Fire Plan Objectives Are Met:

E. Smoke Dispersal Monitoring Required and Procedures:

ELEMENT 21: POST-BURN ACTIVITIES

Post-burn Activities That Must be Completed:

APPENDICES

A. Maps: Vicinity and Project

B. Technical Review Checklist

C. Complexity Analysis

D. Job Hazard Analysis

E. Fire Behavior Modeling Documentation or Empirical Documentation (unless it is included in the fire behavior narrative in Element 7; Prescription)

B. TECHNICAL REVIEWER CHECKLIST

PRESCRIBED FIRE PLAN ELEMENTS:	S /U	COMMENTS
1. Signature page		
2. GO/NO-GO Checklists		
3. Complexity Analysis Summary		
4. Description of the Prescribed Fire Area		
5. Goals and Objectives		
6. Funding		
7. Prescription		
8. Scheduling		
9. Pre-burn Considerations		
10. Briefing		
11. Organization and Equipment		
12. Communication		
13. Public and Personnel Safety, Medical		
14. Test Fire		
15. Ignition Plan		
16. Holding Plan		
17. Contingency Plan		
18. Wildfire Conversion		
19. Smoke Management and Air Quality		
20. Monitoring		
21. Post-burn Activities		
Appendix A: Maps		
Appendix B: Complexity Analysis		
Appendix C: JHA		
Appendix D: Fire Prediction Modeling Runs		
Other		

= Satisfactory **U = Unsatisfactory**

Recommended for Approval: **Not Recommended for Approval:**

_____ _____ _____

Technical Reviewer Qualification and currency (Y/N) Date

□ Approval is recommended subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.

Appendix D: FMU Physical and Biological Addendum

Big Muddy National Fish and Wildife Refuge

The Big Muddy NFWR currently consists of 16,700 acres of bottomland and upland habitat. There are nine refuge units spread along the lower Missouri River between Kansas City, MO and Saint Louis, MO. The terrain of the refuge is characterized by steeply sloping hillsides or bluffs that connect higher elevation uplands to the river floodplain. The refuge is subject to large seasonal variation in river flow and precipitation. These dynamic conditions result in a diversity of floodplain habitat, including sloughs, chutes, owbow lakes, sandbars, deep pools, marshes, seasonally-flooded bottomland forest, and wet prairies.

Climate

The climate of Missouri features mild winters and warm summers. Normal precipitation at Kansas City is 37.62 inches and at St. Louis is 37.51 inches. Kansas City reports a normal maximum temperature for January of 35° Fahrenheit (F) and a normal minimum of 17° F; and for July, a normal maximum of 89° F and normal minimum of 68° F. St. Louis reports a normal maximum temperature for January of 38° F and a normal minimum of 21° F; and for July, a normal maximum of 89° F and a normal minimum of 70° F. Extreme temperatures for Kansas City range from a high of 109° F to a low of -23° F while St. Louis reports extremes of 107° F to -18° F.

Fire Season

Typically, most areas of Missouri have a split fire season. The spring fire season occurs from the time of snow melt until the vegetation has begun its growth (green-up). This part of the fire season may run from March until early to mid-May. A fall fire season follows the growing season. It usually is enhanced or commences with the first frost which cures the grasses and fine fuels. It also signifies the end of that year's growing season. The fall fire season may occur from September through mid-December depending on the precipitation and weather patterns. Given the dry and cold climate, fires may easily occur whenever a lack of precipitation has been evident for any period of days.

Wildlife

Over 300 species of birds have been observed on Big Muddy NFWR since its inception. Refuge lands are important for a variety of migratory birds including waterfowl and neotropical migrants. There are over 90 species of fish that are known to occur in the lower Missouri River, including the federally endangered pallid sturgeon (Grace and Pflieger 1985, Gelwicks 1996, Hooker 1996, Kubisiak 1996, Funk and Robinson 1974). The refuge supports an assortment of mammals including white-tailed deer, coyote, red fox, raccoon, muskrat, striped skunk, meadow vole, mink and bobcats. There are 133 known species of butterflies and moths, including the regal fritillary. Common amphibians on the refuge would include southern leopard frog, small-mouthed salamander and American toad. Snapping turtle, western painted turtle, false map turtle, and black rat snake are a few of the reptiles that can be found using the refuge.

Appendix G contains the Federal and State listed threatened and endangered species present in Missouri. Three of those listed species, the interior least tern, piping plover, and pallid sturgeon, are know to occur on the refuge.

Appendix E: Cooperator Contacts

BIG MUDDY NATIONAL FISH AND WILDLIFE REFUGE PHONE NUMBERS 2010

UNIT: U.S. Fish and Wildlife Service	**ADDRESS:** 4200 New Haven Rd. Columbia, MO 65201	**FIRE PHONE:** 573-876-1826
SUB-UNIT:	**IDENTIFIERS:** **JETPORT:**	**FAX:** 573-876-1839 **E-MAIL:** ***first_lastname@fws.gov***

NAME / TITLE	**OFFICE NUMBER/S**	**Cell Number**		**FIRE QUALS.**
Tom Bell Refuge Manager	573-441-2786	999-5204		
Dean Bossert Assistand Refuge Manager	573-441-2787			FFT2, FALB
Wedge Watkins Wildlife Biologist	573-441-2788			
Tim Haller Park Ranger	573-441-2799			HMGB, HECM, ABRO, FFT1, FALB
Molly Comstock Administrative Officer	573-876-1899	239-3378		
Wes Verrill LE Officer	573-441-22954	999-1694		
Jestin Clark Wildlife Refuge Specialist	573-441-2987			FFT2, FALB
Randy Stenberg Maintanence	573-441-2948			FFT2, FALB
Bailey Yotter STEP				FFT2

Missouri-Iowa Coordination Center (MO-MOC) DISPATCH, Rolla, MO
573-341-7484 FAX 573-426-6800

Agency Support

Name	Position	Work #	Cell #	Home #
Clifford Berger	South Zone FMO, Quincy, IL	217-224-8580	217-242-7767	217-936-3114
Stephen Jakala	RFMC, Region 3 Office	612-713-5366	612-817-6797	
Liz Barrera	Missouri Interagency Coordination Center	573-341-7455		573-426-5249
Dave Mosher	Missouri Interagency Coordination Center	573-364-4621		

MINNESOTA INTERAGENCY FIRE CENTER NUMBERS
Minnesota Interagency Fire MOB CENTER 218-727-9253

EASTERN AREA COORDINATION CENTER

EACC 612-713-7300

COOPERATOR PHONE LIST

CONTACT NAME:	OFFICE PHONE:	HOME PHONE:	CELL PHONE:	PAGER:
National Weather Service St. Louis, MO	636-441-8467			
National Weather Service Kansas City, MO	816-540-6021			
Missouri State Highway Patrol	573-751-3313			
Arrow Rock VFD	660-837-3479			
Chamois FPD	**573-763-5775**			
Cooper County FPD	660-882-6111			
Howard County FPD	660-248-5198			
Malta Bend FD	**660-595-2200**			
Orrick FPD	816-496-3902			
Monarch FPD	314-514-0900			
Waverly VFD	660-493-2551			

Appendix F: Cooperative Agreements

Cooperative Fire Protection Agreements are currently in place between Big Muddy NFWR and Arrow Rock Community VFD, Chamois FPD, Cooper County FPD, Howard County FPD, Malta Bend Fire Department, Monarch FPD, Orrick FPD, and Waverly RFD.

Appendix G: Plant and Animal Species within the Big Muddy NFWR.

Scientific Name	Common Name
Plants	
Herbaceous Plants	
Abutilon theophrasti	Velvetleaf
Acalypha rhomboidea	Common threeseed mercury
Acaypha ostryifolia	Pineland threeseeded mercury
Acalypha virginiana	Virginia three-seeded mercury
Agrostis alba	Redtop
Alliaria petiolata	Garlic mustard
Amaranthus tamariscinus	Tall amaranth
Ambrosia artemisifolia	Common ragweed
Ambrosia trifida	Giant Ragweed
Ammannia Coccinea	Purple ammania
Amorpha brachycarpa	Leadplant
Ampelopsis cordata	Heartleaf peppervine
Amphicarpea bracteata var comosa	
Andropogon gerardii	Big Bluestem
Andropogon scoparius	Little bluestem
Anemone canadensis	White Aneemone
Apocynum cannabinum	Indian hemp
Aristolochia tomentosa	Wooly dutchman's pipe
Atemesia annua	Sweet sagewort
Asarum canadense	Wild Ginger
Asclepias incarnata	Swamp milkweed
Asclepias purpurascens	Purple milkweed
Asclepias syriaca	Common milkweed
Aster lateriflous	Calico aster
Aster pilosus	Hairy white old field aster
Aster subulatus	Eastern annual saltmarsh aster
Bergia taxana	Texas bergia
Bidens cernua	Nodding Beggerstick
Bidens connata	Purple stem beggarticks
Boemeria cylindrica	False nettle
Callitriche terrestris	Terestrial water starwort
Campsis radicans	Trumpet creeper
Cardamine hirsuta	Hoary bitter cress

Carex crus-corvi	Raven-foot sedge
Carex hyalinolepis	Shoreline sedge,Thinscale sedge
Carex molesta	Troublesome sedge
Calystegia sepium	Hedge field bindweed
Cassia fasciculata	Sleeping plant
Castilleja coccinia	Indian Paintbrush
Cenchrus longispinus	Mat sandbur
Chasmanthium latifolium	Indian woodoats
Chenopodium album	Lambsquarters
Cicuta maculata	Spotted Wter hemlock
Cirsium altissimum	Tall thistle
Conobea multifida	Narrowleaf paleseed
Conyza canadensis	Canadian horseweed
Croton glandulosus	Vente conmigo
Croton monanthogynus	Prairie tea
Cynanchum laeve	Honeyvine
Cyperus erythrorhizos	Redroot flatsedge
Cyperus squarrosus	Bearded flatsedge
Cyperus oderatus	Fragrant flatsedge
Cyperus strigosus	Straw colored flatsedge
Desmanthus illinoensus	Illinois budle flower
Desmodium dillenii.	Dillenius tricktrefoil
Desmodium paniculatum	Panicledleaf Ticktrefoil
Digitaria cognata	Carolina crabgrass
Digitaria ischaemum	Smooth crabgrass
Diodia teres	Poorjoe
Echinochloa crus-galli	Barnyard grass
Echinodorus berteroi	Upright burrhead
Eclipta prostrata	False daisy
Eleocharis ovata	Ovate spikerush
Elephantopus carolinus	Carolina elephantsfoot
Elymus virginicus	Virginia wildrye
Equisetum arvense	Field horsetail
Equisetum hyemale	Scouringrush horsetail
Eragrostis cilianensis	Stink grass
Eragrostis pectinacea	Tufted lovegrass
Erechitites hieraciifolia	American burnweed
Erigeron annuus	Eastern daisy fleabane
Erigeron strigosus	Daisy fleabane
Euonymus fortunei	Winter creeper
Eupatorium perfoliatum	Boneset

Eupatorium rugosum	White snakeroot
Eupatorium sertinum	Late flowering thoroughwort
Euphorbia dentata	Toothed spurge
Euphorbia maculata	Nodding spurge
Euphorbia supina	Spotted sandmat
Festuca obtusa	Nodding fescue
Galium triflorum	Fragrant bedstraw
Geum vernum	Spring water avens
Glechoma hederacea	Ground ivy
Grindella squarrosa	Curly-cup gumweed
Helianthus annuus	Common Sunflower
Hibiscus militaris	Halberdleaf rosemallow
Humulus japonicus	Japonese hops
Impatiens capensis	Impatiens
Impatiens pallida	Impatiens
Ipomoae hederacea	Ivyleaf norning-glory
Ipomoea lacunosa	Whitestar
Ipomoea panduata	Man of the earth
Iva Ciliata	Annual marshelder
Lactuca canadensis	Canada lettuce
Lactuca floridana	Woodland lettuce
Leersia virginica	Whitegrass
Leptochloa panicea	Mucronate sprangletop
Lindernia dubia,var,anagallidea	Yellowseed false pimpernel
Lippia lanceolata	Lanceleafed frogfruit
Lobelia siphlitica	Blue Lobelia
Ludwigia alternifolia	Seedbox
Lycopus americana	American water horehound
Lycopus virginicus	Virginia water horehound
Lysimachia nummularia	Creeping jenny
Lythrum salicaria	Purple loosestrife
Menispermum canadense	Moonseed vine
Mentha arvensis	Field mint
Melilotus	Yellow sweetclover
Mimulus alatus	Monkey flower
Mollugo verticillata	Green carpetweed
Muhlenbergia sobolifera	Rock muhly
Oenothera biennis	Common evening primrose
Oenothera laciiata	Cutleaf evening primrose
Oxalis dilleni	Common yellow oxalis
Panicum capillare	Witchgrass

Panicum virgatum	Switchgrass
Parietaria pensylvanica	Pennsylvania pellitory
Paspalum laeve	Field paspalum
Penthorum sedoides	Ditch stonecrop
Penstemon digitalis	Beard tongue
Perilla frotesceus	Beefsteak
Phalaris arundinacea	Reed canarygrass
Phragmites australis	Common Reed
Phyla lanceolata	Fog fruit
Physalis heterophylla	Clammy groundcherry
Physalis Missouriensis	Missouri groundcherry
Physalis Virginiana	Virginia groundcherry
Phytolacca americana	Pokeweed
Pilea pumila	Canadian clearweed
Podophyllum peltatum	May Apple
Polygonum coccineum	Longroot smartweed
Polygonum Hydropepperoides	Water pepper
Polygonum pensylvanicum	Pennsylvania smartweed
Portulaca oleracea	Little hogweed
Pueraria montana	Kudzu
Pyrrhopappus carolianus	Carolina desert-chicory
Rorippa sessilflora	Stalkless yellowcress
Roripa sylvestris	Creeping yellowcress
Rotala ramosior	Lowland rotala
Rudbeckia laciniata	Cutleaf coneflower
Rumex crispus	Curly dock
Scirpus Fluviatilis	River Bulrush
Scrophularia marilandica	Carpenter's square
Setaria viridis	Green bristlegrass
Sicyos angulatus	Bur cucumber
Sida spinosa	Prickly fanpetals
Solanum carolinense	Horse nettle
Solidago altissima	Canada goldenrod
Solidago gigantea	Giant goldenrod
Sonchus asper	Spint sowthistle
Sorgastrum nutans	Indiangrass
Sorghum bicolor	Shatter cane
Sorghum halepense	Johnson grass
Spartina pectinacea	Prairie cordgrass
Spermacocoe glabra	Smooth false buttonweed
Sporobolus cryptandrus	Sand dropseed

Stachys tenuiolia	Smooth hedgenettle
Stellaria media	Chickweed
Strophostyles helvula	Wild Bean
Symphoricarpos orbiculatus	Corralberry
Tercium canadense	Canada germander
Thlaspi arvense	Field pennycress
Tridens flavus	Purpletop tridens
Trifolium campestre	Field clover
Trillium sessile	Wake Robin
Triplasis purpurea	Purple sandgrass
Tripsacum dactyloides	Eastern gamagrass
Urtica dioica	Stinging nettle
Verbena urticifolia	White vervain
Veronia baldwinii	Baldwin's ironweed
Viola rafinesquii	Johnny-jump-up
Viola sororia	Wooley Blue Violet
Xanthium strumarim	Cocklebur

Shrubs/Vines

Cornus drumondii	Rough-leaved dogwood
Asimina triloba	Pawpaw
Campsis radicans	Trumpet creeper
Cephalanthus occidentalis	Button Bush
Parthenocissus quinquefolia	Virginia creeper
Rhus glabra	Smooth sumac
Toxicodendron radicans	Poison ivy
Rubus pensilvanicus	Pennsylvania blackberry
Symphoricarpos orbiculatus	Buckbrush
Vitis aestivalis	Summer grape
Vitis rupestris	Sand grape
Vitis vulpina	Frost grape
Smilax tamnoides	Bristly greenbriar
Lonicera maackii	Bush honeysuckle

Trees

Acer negundo	Boxelder
Acer saccharinum	Silver maple
Betula nigra	River birch
Carya illinoensis	Common Pecan
Celtis laevigata	Sugarberry
Celtis occidentalis	Common Hackberry

Cercus canadensis	Eastern Redbud
Diospyros virginiana	Common persimmon
Fraxinus pennsylvanica	Green ash
Gleditsia triacanthos	Honeylocust
Gymnocladus dioicus	Kentucky coffeetree
Juglans nigra	Black walnut
Juniperus virginiana	Eastern redcedar
Malcur pomifera	Osage Orange
Morus rubra	Red mulberry
Nyssa sylvatica	Blackgum
Platanus occidentalis	American sycamore
Populus deltoides	Eastern cottonwood
Prunus Amaricana	American plum
Quercus bicolor	Swamp white oak
Quercus imbricaria	Shingle Oak
Quercus macrocarpa	Bur Oak
Quercus palustris	Pin oak
Salix caroliniana	Coastal plain willow
Salix exigua	Sandbar willow
Salix nigra	Black willow
Sassafras albidum	Sassafras
Tilia americana	American basswood
Ulmus americana	American elm
Ulmus rubra	Slippery elm

Moths and Butterflies

Swallowtails

Eurytides marcellus (Cramer)	Zebra Swallowtail
Papilio polyxenes asterius Stoll	Black Swallowtail
Papillo cresphontes (Cramer)	Giant Swallowtail
Pterourus glaucus glaucus (Linnaeus)	Tiger Swallowtail
Pterourus troilus troilus (Linnaeus)	Spicebush Swallowtail

Whites And Sulphurs

Ponita protodice (Boisduval & Leconte)	Checkered White
Pieris rapae	Cabbage White
Artogeia rapae (Linnaeus)	European Cabbage Butterfly
Falcapica midea (Hübner)	Falcate Orange Tip
Colias philodice philodice Godart	Clouded Sulphur
Colias eurytheme Boisduval	Alfalfa Butterfly

Phoebis sennae eubule (Linnaeus)	Cloudless Sulphur
Pyrisitia lisa lisa (Boisduval & Leconte)	Little Sulphur
Abaeis nicippe (Cramer)	Sleepy Orange
Nathalis iole Boisduval	Dainty Sulphur

Glossamer-Wing Butterflies

Hyllolycaena hyllus (Cramer)	Bronze Copper
Strymon melinus Hübner	Gray Hairstreak
Everes comyntas comyntas (Godart)	Eastern-tailed Blue

Brushfooted Butterflies

Libytheana carinenta (Cramer)	American Snout
Euptoieta claudia (Cramer)	Variegated Fritillary
Speyeria cybele cybele (Fabricius)	Great Spangled Fritillary
Speyeria idalia (Drury)	Regal Fritillary
Phyciodes tharos tharos (Drury)	Pearl Crescent
Polygonia interrogationis (Fabricius)	Question Mark or Violet Tip
Polygonia comma (Harris)	Comma or Hop Merchant
Vanessa cardui (Linnaeus)	Painted Lady
Vanessa atalanta rubria (Fruhstorfer)	Red Admiral
Junonia coenia Hubner	Common Buckeye
Limenitis archippus archippus (Cramer)	Viceroy
Limenitis arthemis astyanax (Fabricius)	Red-spotted Purple
Anaea andria Scudder	Goatweed Leafwing
Asterocampa celtis celtis (Boisduval & Leconte)	Hackberry Emperor
Asterocampa clyton clyton (Boisduval & Leconte)	Tawny Emperor
Megisto cymela cymela (Cramer)	Little Wood Satyr
Cercyonis pegala (Fabricius)	Wood Nymph
Danaus plexippus (Linnaeus)	Monarch

Skippers

Epargyreus clarus clarus (Cramer)	Silver-spotted Skipper
Thorybes bathyllus (J.E. Smith)	Southern Cloudy Wing
Staphylus hayhurstii (W.H. Edwards)	Hayhurst's Scallopwing
Pyrgus communis (Grote)	Checkered Skipper
Pholisora catullus (Fabricius)	Common Sooty Wing
Atrytone logan logan (W.H. Edwards)	Delaware Skipper
Poanes hobomok (Harris)	Hobomok Skipper
Poanes taxiles (W.H. Edwards)	Taxiles Skipper

Pyralid Snout Moths

Desmia funeralis (Hübner)	Grape Leaf Folder Moth
Pyrausta insequalis (Guenée)	Pyralid Moth

Urola nivalis (Drury)	Snowy Urola Moth
Agriphila vulgivagella (Clemens)	Vagabond Crambus
Saucrobotys futilalis (Lederer)	Dogbane Saucrobotys Moth
Nomophila nearctica Munroe	Celery Webworm Moth
Crambus trisectus Walker	Sod Webworm
Ostrinia nubilalis (Hübner)	European Corn Borer Moth
Hymenia perspectalis (Hübner)	Spotted Beet Webworm Moth
Nephopterix basilaris (Zeller)	Nephopterix Moth
Diastictis argyralis (Hübner)	White-spotted Orange Moth

Inchworms

Haematopis grataria (Fabricus)	Chickweed Geometer
Calothysanis amaturaria (Walker)	Cross-lined Wave
Anavitrinella pampinaria (Guenée)	Cranberry Spanworm/Common Gray
Eusarca confusaria (Hübner)	Confused Eusarca
Scopula inductata (Guenée)	Soft- lined wave
Xanthotype sospeta (Drury)	Crocus Geometer
Xanthotype urticaria Swett	Buttercup Moth
Apicia confusaria	
Digrammia subminiata (Packard)	Dark waved Angle
Synchlora aerata (Fabricius)	Wavy-lined Emerald
Nemoria lixaria (Guenée)	Red-bordered Emerald
Metanema inatomaria Guenée	Pale Metanema
Mellilla xanthmetata (Walker)	Orange Wing
Prochoerodes transversata (Drury)	Large Maple Spanworm Moth
Eutrapela clemataria (J.E. Smith)	Curve-Toothed Geometer
Tornos scolopacinarius (Guenée)	Dimorphic gray

Sphinx Moths

Smerinthus jamaicensis (Drury)	Twin Spotted Sphinx
Hemaris diffinis (Boisduval)	Snowberry Clearwing
Pachysphinx modesta (Harris)	Big Poplar Sphinx or Modest Sphinx
Ceratomia hageni Grote	Osage Orange Sphinx
Laothoe juglandis (J.E. Smith)	Walnut Sphinx
Paratrea plebeja (Fabricius)	Plebian Sphinx
Ceratomia catalpae (Boisduval)	Catalpa Sphinx
Darapsa myron (Cramer)	Grape-vine Sphinx or Hog Sphinx
Ceratomia undulosa (Walker)	Waved Sphinx
Hyles lineata (Fabricius)	White-lined Sphinx

Giant Silkworm Moths / Emperors

Antheraea polphemus (Cramer)	Polyphemus

Sphingicampa bicolor (Harris)	Honey Locust Moth

Leaf Roller Moths

Sparganothis sulfureana (Clemens)	Sparganothis Fruitworm Moth
Choristoneura rosaceana (Harris)	Oblique-banded Leafroller Moth

Prominents

Datana perspicua Grote & Robinson	Spotted Datana
Pheosia rimosa Packard	Black-rimmed Prominent
Nadata gibbosa (J.E.Smith)	Rough Prominent

Owlet Moths

Caenurgina erechtea (Cramer)	Forage Looper or Clover Looper Moth
Cirrhophanus triangulifer Grote	Goldenrod Stowaway
Zale lunata (Drury)	Lunate Zale
Catocala cara Guenée	Darling Underwing
Acontia aprica (Hübner)	Exposed Bird-dropping Moth
Thioptera nigrofimbria (Guenée)	Black-Bordered Lemon Moth
Psychomorpha epimenis (Drury)	Grapevine Epimenis
Eudryas grata (Fabricius)	Beautiful Wood-nymph
Alypia octomaculata (Fabricius)	Eight-spotted Forester
Helicoverpa zea (Boddie)	Corn Earworm
Proxenus miranda (Grote)	Miranda Moth
Schinia arcigera (Guenée)	Arc-lined Flower Moth
Schinia Lynx	Fleabane Flower Moth
Spaelotis clandestina (Harris)	Well-Marked Cutworm Moth
Agrotis ipsilon (Hufnagel)	Ipsilon Dart or Black Cutworm
Pseudaletia unipuncta (Haworth)	Army Worm Moth
Argyrostrotis quadrifilaris	Four-lined Chocolate
Anagrapha falcifera (Kirby)	Celery Looper
Spodoptera ornithogalli (Guenée)	Yellow-striped Army Worm
Simyra henrici (Grote)	Cattail Catapillar
Orgyia leucostigma (J.E.Smith)	White-marked Tussock Moth
Felita jaculifera (Guenée)	Dingy Cutworm or Clay-backed Cutworm

Tiger Moths

Apantesis nais (Drury)	Banded Tiger Moth
(*Apantesis nais*)	Nais Tiger Moth
Grammia oithona (Strecker)	Straight-lined Tiger Moth
Grammia virgo (Linnaeus)	Virgin Tiger Moth
Haploa reversa(Stretch)	Reversed Haploa Moth
Haploa colona (Hübner)	Colona Moth

Cisseps fulvicollis (Hübner)	Yellow-collared Scape Moth
Cycnia tenera Hübner	Orange-margined Dogbane Moth
Clemensia albata (Packard)	Little White Lichen Moth
Holomelina aurantiaca (Hübner)	Orange Holomelina
Euchaetes egle(Drury)	Milkweed Tussock Moth
Estigmene acrea(Drury)	Acrea Moth
Halysidota tessellaris (J.E.Smith)	Banded Tussock Moth
Hyphantria cunea (Drury)	Fall Webworm Moth
Cisthene plumbea Stretch	Lead-Colored Lichen Moth
Cycnia oregonensis (Stretch)	Oregon Cycnia
Spilosoma virginica	Yellow Bear
Ecpantheria scribonia	Giant Leopard Moth

Bees and Wasps

Bumble Bees

Bombus auricomus (Robertson)
Bombus griseocollis (DeGeer)
Bombus imaptiens Cresson
Bombus bimaculatus Cresson
Bombus pensylvanicus (DeGeer)

Long-horned Bees

Melissodes bimaculata (Lepeletier)
Melissodes comptoides Robertson)
Melissodes coreopsis (Robertson)
Melissodes desponsa (Smith)
Melissodes trinodis Robertson
Eucera rosae (Robertson)
Eucera hamata (Bradley)
Svastra atripes (Cresson)

Carpenter Bees

Xylocopa virginica (Cresson)

Small Carpenter Bees

Ceratina calcarata (Robertson)
Ceratina dupla (Provancher)
Ceratina strenus Smith

Cuckoo Bees

Nomada SP#1
Nomada SP#2
Nomada SP#3

Triepeolus Sp#1

Honey Bee

Apis mellifera Linnaeus

Digger Bees

Ptilothrix bombiformis (Cresson)

Florilegus condignus (Cresson)

Sand Bees, Mining Bees

Perdita halictoides (Cockerell)

Perdita octomaculata (Say)

Calliopsis andreniformis (Smith)

Andrena andrenoides (Cresson) red form

Andrena erythrogaster (Ashmead)

Andrena carlini (Cockerell)

Andrena commoda (Robertson)

Andrena cressonii (Cockerell)

Andrena Erigeniae

Andrena imatatrix

Andrena miserabilis (Smith)

Andrena nasonii (Viereck)

Andrena rudbeckiae (Robertson)

Andrena violae (Robertson)

Pseudopanurgus albitarsis (Cresson)

Anthophora abrupta (Smith)

Plasterer Bees

Colletes latitarsus (Robertson)

Collettes inequalis (Cresson)

Hylaeus mesillae (Cockerell)

Sweat Bees

Halictus confusus (Smith)

Halictus ligatus (Cresson)

Halictus parallelus Say

Halictus rubicundus (Christ)

Halictus tripartitns

Augochlorella persimilis (Viereck)

Augochlorella aurata (Smith)

Augochlora pura (Say)

Augochloropsis metallica (Fabricius)

Agapostemon texanus Cresson

Agapostemon virescens (Fabricius)

Agapostemon sericeus (Förster)

Dieunomia hetropoda (Say)

Lasioglossum bruneri (Crawford)
Lasioglossum callidum
Lasioglossum coreopsis (Robertson)
Lasioglossum coriaceum
Lasioglossum cressonii (Robertson)
Lasioglossum disparila
Lsioglossum forbesii
Lasioglossum hartii (Robertson)
Lasioglossum imitatum (Smith)
Lasioglossum mitchelli
Lasioglossum nelumbonis
Lasioglossum obscurum (Robertson)
Lasioglossum oceanicum (Cockerell)
Lasioglossum pectorale (Smith)
Lasioglossum pictum (Crawford)
Lasioglossum pilosum (Smith)
Lasioglossum versatum (Robertson)
Lasioglossum truncatum (Robertson)
Lasioglossum tegulare (Robertson)
Lasioglossum zephyrum (Smith)
Sphecodes dichrous Smith

Leafcutting Bees

Hoplitis producta (Cresson)
Hoplitis pilosifrons (Cresson)
Megachile brevis(Say)
Megachile mendiea
Megachile montivaga Cresson
Megachile petulaus
Megachile xylocopoides Smith

Mason Bees

Osmia conjuncta (Cresson)
Osmia pumila (Cresson)
Osmia georgica Cresson
Osmia collinsiae Robertson

Wasps

Ammophila
Astata
Oxybelus
Myzinum berlyi berlyi
Myzinum obscurum
Myzinum quinquecinctum

Polistes fuscatus
Polistes exclamans
Polistes metricus
Polistes metriens
Dolichovespula maculata
Sphecius speciosus
Sceliphron caementarinm
Thyredon aticolor

Birds

Swans, Geese, & Ducks

Anser albifrons	Greater White-fronted Goose
Anser caerulescens	Snow Goose
Anser rossii	Ross's Goose
Branta hutchinsii	Cackling Goose
Branta canadensis	Canada Goose (resident)
Branta canadensis	Canada Goose (migrant)
Cygnus buccinator	Trumpeter Swan
Cygnus columbianus	Tundra Swan
Aix sponsa	Wood Duck
Anas strepera	Gadwall
Anas americana	American Wigeon
Anas rubripes	American Black Duck
Anas platyrhynchos	Mallard
Anas discors	Blue-Winged Teal
Aythya valisineria	Canvasback
Aythya americana	Redhead
Aythya collaris	Ring-necked Duck
Aythya marila	Greater Scaup
Aythya affinis	Lesser Scaup
Melanitta perspicillata	Surf Scoter
Melanitta deglandi	White-winged Scoter
Melanitta americana	Black Scoter
Clangula hyemalis	Long-tailed Duck
Bucephala albeola	Bufflehead
Bucephala clangula	Common Goldeneye
Mergus cucullatus	Hooded Merganser
Mergus merganser	Common Merganser
Mergus serrator	Red-breasted Merganser

Oxyura jamaicensis	Ruddy Duck
Quail	
Colinus virginianus	Northern Bobwhite
Grouse & Turkey	
Phasianus colchicus	Ring-necked Pheasant
Bonasa umbellus	Ruffed Grouse
Meleagris gallopavo	Wild Turkey
Loons	
Gavia immer	Common Loon
Grebes	
Podilymbus podiceps	Pied-billed Grebe
Podiceps auritus	Horned Grebe
Podiceps nigricollis	Eared Grebe
Aechmophorus occidentalis	Western Grebe
Cormorants	
Phalacrocorax auritus	Double-crested Cormorant
Pelicans	
Pelecanus erythrorhynchos	American White Pelican
Herons & Bitterns	
Botaurus lentiginosus	American Bittern
Ixobrychus exilis	Least Bittern
Ardea herodias	Great Blue Heron
Egretta alba	Great Egret
Egretta thula	Snowy Egret
Egretta caerulea	Little Blue Heron
Bubulcus ibis	Cattle Egret
Butorides virescens	Green Heron
Nycticorax nycticorax	Black-crowned Night-Heron
Nyctanassa violacea	Yellow-crowned Night-Heron
Ibises	
Plegadis falcinellus	Glossy Ibis
Plegadis chihi	White-faced Ibis
Vultures	
Cathartes aura	Turkey Vulture
Coragyps atratus	Black Vulture
Hawks & Eagles	
Ictinia mississippiensis	Mississippi Kite
Haliaeetus leucocephalus	Bald Eagle
Circus cyaneus	Northern Harrier
Accipiter striatus	Sharp-shinned Hawk
Accipiter cooperii	Cooper's Hawk

Accipiter gentilis	Northern Goshawk
Buteo lineatus	Red-shouldered Hawk
Buteo platypterus	Broad-winged Hawk
Buteo swainsoni	Swainson's Hawk
Buteo jamaicensis	Red-tailed Hawk
Buteo lagopus	Rough-legged Hawk
Aquila chrysaetos	Golden Eagle
Pandion haliaetus	Osprey
Falcons	
Falco sparverius	American Kestrel
Falco columbarius	Merlin
Falco peregrinus	Peregrine Falcon
Falco mexicanus	Prairie Falcon
Ralis & Coots	
Coturnicops noveboracensis	Yellow Rail
Rallus elegans	King Rail
Rallus limicola	Virginia Rail
Sora	
Porzana carolina	Sora
Porphyrio porphyrio	Purple Gallinule
Gallinula chloropus	Common Moorhen
Fulica americana	American Coot
Cranes	
Grus canadensis	Sandhill Crane
Plovers	
Pluvialis squatarola	Black-bellied Plover
Pluvialis dominica	American Golden-Plover
Charadrius alexandrinus nivosus	Snowy Plover
Charadrius semipalmatus	Semipalmated Plover
Charadrius melodus	Piping Plover (Great Plains)
Charadrius vociferus	Killdeer
Avocets & Stilits	
Himantopus mexicanus	Black-necked Stilt
Recurvirostra americana	American Avocet
Sandpipers	
Actitis macularius	Spotted Sandpiper
Tringa solitaria	Solitary Sandpiper
Tringa melanoleuca	Greater Yellowlegs
Catoptrophorus semipalmatus	Willet
Tringa flavipes	Lesser Yellowlegs
Bartramia longicauda	Upland Sandpiper

Numenius phaeopus	Whimbrel
Limosa haemastica	Hudsonian Godwit
Limosa fedoa	Marbled Godwit
Arenaria interpres	Ruddy Turnstone
Calidris alba	Sanderling
Calidris pusilla	Semipalmated Sandpiper
Calidris mauri	Western Sandpiper
Calidris minutilla	Least Snadpiper
Calidris fuscicollis	White-rumped Sandpiper
Calidris bairdii	Baird's Sanpiper
Calidris melanotos	Pectoral Sandpiper
Calidris alpina	Dunlin
Calidris himantopus	Stilt Sandpiper
Tryngites subruficollis	Buff-breasted Sandpiper
Limnodromus griseus	Short-billed Dowitcher
Limnodromus scolopaceus	Long-billed Dowitcher
Gallinago delicata	Wilson's Snipe
Scolopax minor	American Woodcock
Phalaropus tricolor	Wilson's Phalarope
Phalaropus lobatus	Red-necked Phalarope
Gulls & Terns	
Larus philadelphia	Bonaparte's Gull
Larus atricilla	Laughing Gull
Larus pipixcan	Franklin's Gull
Larus delawarensis	Ring-billed Gull
Larus argentatus	Herring Gull
Larus thayeri	Thayer's Gull
Larus fuscus	Lesser Black-backed Gull
Larus hyperboreus	Glaucous Gull
Larus sabini	Sabine's Gull
Sternula antillarum	Least Tern (Interior)
Sterna caspia	Caspian Tern
Chlidonias niger	Black Tern
Sterna hirundo	Common Tern
Sterna forsteri	Forster's Tern
Pigeon's & Doves	
Columba livia	Rock Pigeon
Streptopelia decaocto	Eurasian Collared-Dove
Zenaida macroura	Mourning Dove
Cuckoos	**Cuckoos**
Coccyzus americanus	Yellow-billed Cuckoo

Coccyzus erythrophtalmus	Black-billed Cuckoo
Barn Owls	
Tyto alba	Barn Owl
Owls	
Otus asio	Eastern Screech-Owl
Bubo virginianus	Great Horned Owl
Bubo scandiacus	Snowy Owl
Strix varia	Barred Owl
Asio otus	Long-eared Owl
Asio flammeus	Short-eared Owl
Aegolius acadicus	Northern Saw-whet Owl
Nightjars	
Chordeiles minor	Common Nighthawk
Caprimulgus carolinensis	Chuck-will's widow
Caprimulgus vociferus	Whip-poor-will
Swifts	
Chaetura pelagica	Chimney Swift
Hummingbirds	
Archilochus colubris	Ruby-throated Hummingbird
Selasphorus rufus	Rufous Hummingbird
Kingfishers	
Ceryle alcyon	Belted Kingfisher
Woodpeckers	
Melanerpes erythrocephalus	Red-headed Woodpecker
Melanerpes carolinus	Red-bellied Woodpecker
Sphyrapicus varius	Yellow-bellied Woodpecker
Picoides pubescens	Downy Woodpecker
Picoides villosus	Hairy Woodpecker
Colaptes auratus	Northern Flicker
Dryocopus pileatus	Pileated Woodpecker
Flycatchers	
Contopus cooperi	Olive-sided Flycatcher
Contopus virens	Eastern Wood-Pewee
Empidonax flaviventris	Yellow-bellied Flycatcher
Empidonax virescens	Acadian Flycatcher
Empidonax alnorum	Alder Flycatcher
Empidonax traillii	Willow Flycatcher
Empidonax minimus	Least Flycatcher
Sayornis phoebe	Eastern Phoebe
Myiarchus crinitus	Great Crested Flycatcher
Tyrannus verticalis	Western Kingbird

Tyrannus tyrannus	Eastern Kingbird
Tyrannus forficatus	Scissor-tailed Flycatcher
Shrikes	
Lanius ludovicianus	Loggerhead Shrike
Vireos	
Vireo griseus	White-eyed Vireo
Vireo bellii	Bell's Vireo
Vireo flavifrons	Yellow-throated Vireo
Vireo solitarius	Blue-headed Vireo
Vireo gilvus	Warbling Vireo
Vireo philadelphicus	Philadelphia Vireo
Vireo olivaceus	Red-eyed Vireo
Crows & Jays	
Cyanocitta cristata	Blue Jay
Corvus brachyrhynchos	American Crow
Corvus ossifragus	Fish Crow
Larks	
Eremophila alpestris	Horned Lark
Swallows	
Progne subis	Purple Martin
Tachycineta bicolor	Tree Swallow
Stelgidopteryx serripennis	North. Rough-winged Swallow
Riparia riparia	Bank Swallow
Petrochelidon pyrrhonota	Cliff Swallow
Hirundo rustica	Barn Swallow
Chickadees & Titmice	
Poecile carolinensis	Carolina Chickadee
Poecile atricapillus	Black-capped Chickadee
Baeolophus bicolor	Tufted Titmouse
Nuthatches	
Sitta canadensis	Red-breasted Nuthatch
Sitta carolinensis	White-breasted Nuthatch
Creepers	
Certhia americana	Brown Creeper
Wrens	
Thryothorus ludovicianus	Carolina Wren
Thryomanes bewickii	Bewick's Wren
Troglodytes aedon	House Wren
Troglodytes hiemalis	Winter Wren
Cistothorus platensis	Sedge Wren
Cistothorus palustris	Marsh Wren

Gnatcatchers	
Polioptila caerulea	Blue-gray Gnatcatcher
Kinglests	
Regulus satrapa	Golden-crowned Kinglet
Regulus calendula	Ruby-crowned Kinglet
Thrushes	
Sialia sialis	Eastern Bluebird
Catharus fuscescens	Veery
Catharus minimus	Gray-cheeked Thrush
Catharus ustulatus	Swainson's Thrush
Catharus guttatus	Hermit Thrush
Hylocichla mustelina	Wood Thrush
Turdus migratorius	American Robin
Mockingbirds & Thrashers	
Dumetella carolinensis	Gray Catbird
Mimus polyglottos	Northern Mockingbird
Toxostoma rufum	Brown Thrasher
Starlings	
Sturnus vulgaris	European Starling
Pipits	
Anthus rubescens	American Pipit
Anthus spragueii	Sprague's Pipit
Waxwings	
Bombycilla cedrorum	Cedar Waxwing
Warblers	
Vermivora cyanoptera	Blue-winged Warbler
Vermivora chrysoptera	Golden-winged Warbler
Oreothlypis peregrina	Tennessee Warbler
Oreothlypis celata	Orange-crowned Warbler
Oreothlypis ruficapilla	Nashville Warbler
Parula americana	Northern Parula
Dendroica petechia	Yellow Warbler
Dendroica pensylvanica	Chestnut-sided Warbler
Dendroica magnolia	Magnolia Warbler
Dendroica tigrina	Cape May Warbler
Dendroica virens	Black-throated Green Warbler
Dendroica fusca	Blackburnian Warbler
Dendroica dominica	Yellow-throated Warbler
Dendroica pinus	Pine Warbler
Dendroica discolor	Prairie Warbler
Dendroica palmarum	Palm Warbler

Dendroica castanea	Bay-breasted Warbler
Dendroica striata	Blackpoll Warbler
Dendroica cerulea	Cerulean Warbler
Mniotilta varia	Black-and-white Warbler
Setophaga ruticilla	American Redstart
Protonotaria citrea	Prothonotary Warbler
Helmitheros vermivorus	Worm-eating Warbler
Limnothlypis swainsonii	Swainson's Warbler
Seiurus aurocapillus	Ovenbird
Seiurus noveboracensis	Northern Waterthrush
Parkesia motacilla	Louisiana Waterthrush
Oporornis formosus	Kentucky Warbler
Oporornis agilis	Connecticut Warbler
Oporornis philadelphia	Mourning Warbler
Geothlypis trichas	Common Yellowthroat
Wilsonia citrina	Hooded Warbler
Wilsonia pusilla	Wilson's Warbler
Wilsonia canadensis	Canada Warbler
Icteria virens	Yellow-breasted Chat

Sparrows

Pipilo maculatus	Spotted Towhee
Pipilo erythrophthalmus	Eastern Towhee
Aimophila aestivalis	Bachman's Sparrow
Spizella arborea	American Tree Sparrow
Spizella passerina	Chipping Sparrow
Spizella pallida	Clay-colored Sparrow
Spizella pusilla	Field Sparrow
Pooecetes gramineus	Vesper Sparow
Chondestes grammacus	Lark Sparrow
Passerculus sandwichensis	Savannah Sparrow
Ammodramus savannarum	Grasshopper Sparrow
Ammodramus henslowii	Henslow's Sparow
Ammodramus leconteii	Le Conte's Sparrow
Ammodramus nelsoni	Nelson's Sharp-tailed Sparrow
Passerella iliaca	Fox Sparrow
Melospiza melodia	Song Sparow
Melospiza lincolnii	Lincoln's Sparrow
Melospiza georgiana	Swamp Sparrow
Zonotrichia albicollis	White-throated Sparrow
Zonotrichia querula	Harris's Sparrow
Zonotrichia leucophrys	White-crowned Sparrow

Junco hyemalis	Dark-eyed Junco
Calcarius lapponicus	Lapland Longspur
Calcarius pictus	Smith's Longspur
Plectrophenax nivalis	Snow Bunting

Tanagers & Buntings

Piranga rubra	Summer Tanager
Piranga olivacea	Scarlet Tanager
Cardinalis cardinalis	Northern Cardinal
Pheucticus ludovicianus	Rose-breasted Grosbeak
Passerina caerulea	Blue Grosbeak
Passerina cyanea	Indigo Bunting
Passerina ciris	Painted Bunting
Spiza americana	Dickcissel

Blackbirds & Orioles

Dolichonyx oryzivorus	Bobolink
Agelaius phoeniceus	Red-winged Blackbird
Sturnella magna	Eastern Meadowlark
Sturnella neglecta	Western Meadowlark
Xanthocephalus xanthocephalus	Yellow-headed Blackbird
Euphagus carolinus	Rusty Blackbird
Euphagus cyanocephalus	Brewer's Blackbird
Quiscalus quiscula	Common Grackle
Quiscalus mexicanus	Great-tailed Grackle
Molothrus ater	Brown-headed Cowbird
Icterus spurius	Orchard Oriole
Icterus galbula	Baltimore Oriole

Finches

Carpodacus purpureus	Purple Finch
Carpodacus mexicanus	House Finch
Loxia curvirostra	Red Crossbill
Carduelis flammea	Common Redpoll
Carduelis pinus	Pine Siskin
Spinus tristis	American Goldfinch
Coccothraustes vespertinus	Evening Grosbeak

Old World Sparrows

Passer domesticus	House Sparrow

Fish

Acipenser fulvescens	Lake Sturgeon
Alosa alabamae	Alabama Shad
Alosa chrysochloris	Gizzard Shad
Ambloplites rupestris	Rock Bass
Ameiurus melas	Black Bullhead
Ameiurus natalis	Yellow Bullhead
Anguilla rostrata	American Eel
Aplodinotus grunniens	Freshwater Drum
Campostoma oligolepis	Central Stoneroller
Campostoma pullum	Goldfish
Carassius auratus	Grass Carp
Carpoides carpio	River Carpsucker
Carpoides cyprinus	Quillback
Carpoides velifer	Highfin Carpsucker
Catostomus commersoni	White Sucker
Cottus bairdi	Mottled Sculpin
Cottus carolinae	Banded Sculpin
Crystal asprella	Crystal Darter
Ctenopharyngodon idella	Spotfin Shiner
Cycleptus elongatus	Blue Sucker
Cyprinella spiloptera	Common Carp
Cyprinus carpio	Gravel Chub
Dorosoma cepedianum	Threadfin Shad
Dorosoma petenense	Largescale Stoneroller
Erimystax x-punctatus	Western Silvery Minnow
Esox lucius	Northern Pike
Etheostoma blenniodes	Greenside Darter
Etheostoma caeruleum	Rainbow Darter
Etheostoma flabellare	Fantail Darter
Etheostoma nigrum	Johnny Darter
Etheostoma punctulatum	Strippled Darter
Etheostoma spectabile	Orangethroat Darter
Etheostoma tetrazonum	Missouru Saddled Darter
Fundulus catenatus	Northern Studfish
Fundulus notatus	Blackstripe Topminnow
Fundulus olivaceus	Blackspotted Topminow
Fundulus sciadicus	Plains Topminnow
Fundulus zebrinus	Plains Killifish

Gambusia affinis	Western Mosquitofish
Hiodon alosoides	Goldeye
Hiodon tergisus	Mooneye
Hybognanthus argyritis	Brassy Minnow
Hybognanthus placitus	Plains Minnow
Hyognanthus hankinsoni	Skipjack Herring
Hypentelium nigricans	Northern Hog Sucker
Hypopthalmichthys molitrix	Silver Carp
Hypopthalmichthys nobilis	Bighead Carp
Ichthyomyzon castaneus	Chestnut Lamprey
Ictalurus furcatus	Blue Catfish
Ictalurus punctatus	Channel Catfish
Ictiobus bubalus	Smallmouth Buffalo
Ictiobus cyprinellus	Bigmouth Buffalo
Ictiobus niger	Black Buffalo
Labidesthes sicculus	Brook Silverside
Lepisosteus osseus	Longnose Gar
Lepisosteus platostomus	Shortnose Gar
Lepomis cyanellus	Green Sunfish
Lepomis gulosus	Warmouth
Lepomis humilis	Orangespotted Sunfish
Lepomis macrochirus	Bluegill
Lepomis megalotis	Longear Sunfish
Lepomis microlophus	Redear Sunfish
Lota lota	Burbot
Luxilus chrysocephalus	Striped Shiner
Luxilus cornutus	Common Shiner
Luxilus zonatus	Bleeding Shiner
Lyythrurus umbratilis	Redfin Shiner
Macrhybopsis aestivalis	Speckeled Chub
Macrhybopsis gelida	Sturgeon Chub
Macrhybopsis meeki	Sicklefin Chub
Macrhybopsis storeriana	Silver Chub
Micropterus dolomieu	Smallmouth Bass
Micropterus punctultus	Spotted Bass
Micropterus salmoides	Largemouth Bass
Minytrema melanops	Spotted Sucker
Morone chrysops	White Bass
Morone saxatilis	Striped Bass
Moxostama carinatum	River Redhorse
Moxostama duquesnei	Black Redhorse

Moxostoma macrolepidotum	Shorthead Redhorse
Moxostoma erythrurum	Golden Redhorse
Nocomis biguttatus	Hornyhead Chub
Notemigonus crysoleucas	Golden Shiner
Notropis atherinoides	Emerald Shiner
Notropis blennius	River Shiner
Notropis boops	Bigeye Shiner
Notropis buchanani	Ghost Shiner
Notropis dorsalis	Bigmouth Shiner
Notropis ludibundus	Sand Shiner
Notropis nubilus	Ozark Minnow
Notropis rubellus	Rosyface Shiner
Notropis shumardi	Silverband Shiner
Notropis topeka	Topeka Shiner
Notropis wickliffi	Channel Shiner
Noturus exilis	Slender Madtom
Noturus flavus	Stonecat
Noturus gyrinus	Tadpole Madtom
Osmerus mordax	Rainbow Smelt
Percha caprodes	Logperch
Percha flavescens	Yellow Perch
Percina evides Jordan	Gilt Darter
Percina maculata Girard	Blackside Darter
Percina phoxocephala	Slenderhead Darter
Percopsis omiscomaycus	Trout-Perch
Phnacobius mirabilis	Suckermouth Minnow
Phoxinus erythrogaster	Southern Redbelly Dace
Pimephales notatus	Bluntnose Minnow
Pimephales promelas	Fathead Minnow
Platygobio gracilis	Flathead Chub
Polyodon spathula	Paddelfish
Pomoxis annularis	White Crappie
Pomoxis nigromaculatus	Black Crappie
Pylodictis olivaris	Flathead Catfish
Scaphirhynchus albus	Pallid Sturgeon
Scaphirhynchus platorynchus	Shovelnose Sturgeon
Semotilus atromaculatus	Creek Chub
Stizostedion canadense	Sauger
Stizostedion vitreum	Walleye

Amphibians and Reptiles

Amphibians- Salamanders, Toads and Frogs

Cryptobranchus alleganiensis	Hellbender
Siren intermedia nettingi	Western Lesser Siren
Ambystoma annulatum	Ringed Salamanders
Ambystoma maculatum	Spotted Salamander
Ambystoma opacum	Marbled Salamander
Ambystoma texanum	Small-mouthed Salamander
Ambystoma tigrinum tigrinum	Eastern Tiger Salamander
Notophthalmus viridescens louisianensis	Central Newt
Eurycea longicauda	Long-tailed Salamander
Eurycea lucifuga	Cave Salamander
Hemidactylium scutatum	Four-toed Salamander
Plethodon albagula Grobman	Western Slimy Salamander
Plethodon serratus Grobman	Southern Red-backed Salamander
Necturus maculosus maculosus	Common Mudpuppy
Scaphiopus holbrookii holbrokii	Eastern Spadefoot
Spea bombifrons	Plains Spadefoot
Bufo americanus americanus	Eastern American Toad
Bufo cognatus	Great Plains Toad
Bufo fowleri Hinckley	Fowler's Toad
Bufo woodhousii woodhousii	Woodhouse's Toad
Acris crepitans blanchardi	Blanchard's Cricket Frog
Hyla chrysoscelis-Hyla versicolor	Gray Treefrogs
Pseudacris crucifer crucifer	Northern Spring Peeper
Pseudacris triseriata triseriata	Western Chorus Frog
Gastrophryne carolinensis	Eastern Narrow-mouthed Toad
Gastrophryne olivacea	Great Plains Narrow-mouthed Toad
Rana areolata ciculosa	Northern Crawfish Frog
Rana blairi	Plains Leopard Frog
Rana catesbeiana Shaw	Bullfrog
Rana clamitans melanota	Green Frog
Rana palustris	Pickerel Frog
Rana sphenocephala	Southern Leopard Frog
Rana sylvatica	Wood Frog

Reptiles- Crocodilians, Turtles, Lizards and Snakes

Chelydra serpentina serpentina	Common Snapping Turtle
Macrochelys temminckii	Alligator Snapping Turtle

Kinosternon flavescens	Yellow Mud Turtle
Sternotherus odoratus	Common Musk Turtle
Chysemys picta bellii	Western Painted Turtle
Emydoidea blandingii	Blanding's Turtle
Graptemys geographica	Common Map Turtle
Graptemys pseudogeographica	False Map Turtle
Pseudemys concinna concinna	River Cooter
Terrapene carolina triunguis	Three-toed Box Turtle
Terrapene ornata ornata	Ornate Box Turtle
Trachemys scripta elegans	Red-eared Slider
Apalone mutica mutica	Midland Smooth Softshell
Apalone spinifera spinifera	Eastern Spiny Softshell
Crotaphytus collaris collaris	Eastern Collared Lizard
Sceloporus undulatus hyacinthinus	Northern Fence Lizard
Eumeces anthracinus pluvialis	Southern Coal Skink
Eumeces fasciatus	Five-lined Skink
Eumeces laticeps	Broad-headed Skink
Eumeces obsoletus	Great Plains Skink
Eumeces septentrionalis septentrionalis	Northern Prairie Skink
Scincella lateralis	Ground Skink
Cnemidophorus sexlineatus sexlineatus	Six-lined Racerunner
Ophisaurus attenuatus attenuatus	Western Slender Glass Lizard
Carphophis vermis	Western Worm Snake
Columber constictor flaviventris	Eastern Yellow-bellied Racer
Diadophis punctatus arnyi	Prairie Ring-necked Snake
Elpahe guttata emoryi	Great Plains Rat Snake
Elaphe obsoleta obsoleta	Black Rat Snake
Elaphe vulpina vulpina	Western Fox Snake
Heterodon platirhinos	Eastern Hog-nosed Snake
Lampropeltis calligaster calligaster	Prairie Kingsnake
Lampropeltis getula holbrooki	Speckled Kingsnake
Lampropeltis triangulum syspila	Red Milk Snake
Masticophis flagellum flagellum	Eastern Coachwhip
Nerodia erythrogaster flavigaster	Yellow-bellied Water Snake
Nerodia rhombifer rhombifer	Diamond-backed Water Snake
Nerodia sipedon sipedon	Northern Water Snake
Opheodrys aestivus aestivus	Rough Green Snake
Pituophis catenifer sayi	Bullsnake
Regina grahamii	Graham's Crayfish Snake
Storeria dekayi wrightorum	Midland Brown Snake
Storeria occipitomaculata occipitomaculata	Northern Red-bellied Snake

Tantilla gracilis	Flat-headed Snake
Thamnophis proximus proximus	Western Ribbon Snake
Thamnophis radix radix	Eastern Plains Garter Snake
Thamnophis sirtalis sirtalis	Eastern Garter Snake
Tropidoclonian lineatum	Lined Snake
Virginia striatula	Rough Earth Snake
Virginia valeriae elegans	Western Earth Snake
Agkistrodon contortrix phaeogaster	Osage Copperhead
Crotalus horridus	Timber Rattlesnake
Sistrurus catenatus catenatus	Eastern Massasauga Rattlesnake

Mammals

Blarina hylophaga	Elliot's short-tailed Shrew
Canis familiaris	Domestic dog
Canis latrans	Coyote
Castor canadensis	Beaver
Cryptotis parva	Least Shrew
Didelphis virginiana	Virginia Oppossum
Eptesicus fuscus	Big Brown Bat
Geomys bursarius	Plains Pocket Gopher
Glaucomys volans	Southern Flying Squirrel
Lasionycteris noctivagans	Silver-Haired Bat
Lasiurus borealis	Eastern Red Bat
Lasiurus cinereus	Hoary Bat
Lontra canadensis	River Otter
Lynx rufus	Bobcat
Marmota monax	Woodchuck
Mephitis mephitis	Striped Skunk
Microtus ochrogaster	Prairie Vole
Microtus pinetorum	Woodland Vole
Mus musculus	House Mouse
Mustela frenata	Long-tailed Weasel
Mustela vison	Mink
Myotis grisescens	Gray Bat
Myotis lucifugus	Little Brown Bat
Myotis sodalis	Indiana Bat
Neotoma floridana	Eastern Woodrat
Nycticeius humeralis	Evening Bat
Ochrotomys nuttalli	Golden Mouse

Odocoileus virginianus	White-tailed Deer
Ondatra zibethicus	Muskrat
Perimyotis subflavus	Eastern Pipistrelle
Peromyscus leucopus	White-footed Mouse
Poliocitellus franklinii	Franklin's Ground Squirrel
Procyon lotor	Raccoon
Reithrodontomys megalotis	Western Harvest Mouse
Scalopus aquaticus	Eastern Mole
Sciurus carolinensis	Eastern Gray Squirrel
Sciurus niger	Fox Squirrel
Sigmodon hispidus	Hispid Cotton Rat
Sorex longirostris	Southeastern Shrew
Spilogale putorius	Eastern Spotted Skunk
Sylvilagus floridanus	Eastern Cottontail Rabbit
Synaptomys cooperi	Southern Bog Lemming
Taxidea taxus	American Badger
Urocyon cinereoargenteus	Gray Fox
Vulpes vulpes	Red Fox
Zapus hudsonius	Meadow Jumping Mouse

Appendix H: Threatened and Endangered Species, Rare and Declining Species.

Missouri's Federally-listed Threatened, Endangered, Proposed, and Candidate Species

(USFWS)

GROUPS

Threatened and Endangered Animal Listings: Mammals, Birds, Reptiles, Amphibians, Fish, Mussels, Snails, Insects, Crustaceans, and Plants

Threatened and Endangered Plant Listing

T = Threatened, E = Endangered, C = Candidate

MAMMALS
Gray bat (E)
Indiana bat (E)
Ozark big-eared bat (E)

BIRDS
Least tern - Interior population (E)
Piping plover (T)

REPTILES
Eastern massasauga (C)

AMPHIBIANS
Ozark hellbender (T)

FISHES
Arkansas darter (C)
Grotto Sculpin (C)
Neosho madtom (T)
Niangua darter (T)
Ozark cavefish (T)
Pallid sturgeon (E)
Topeka shiner (E)

CLAMS (Freshwater Mussels)
Curtis' pearlymussel (E)
Fat pocketbook (E)
Higgins eye pearlymussel (E)
Neosho mucket (C)
Pink mucket pearlymussel (E)

Rabbitsfoot (C)
Scaleshell (E)
Sheepnose (C)
Snuffbox (PE)
Spectaclecase (C)
Winged mapleleaf (E)

SNAILS
Tumbling Creek cavesnail (E)

INSECTS
Hine's emerald dragonfly (E)

CRUSTACEANS
cave crayfish, no common name (E)

PLANTS
Decurrent false aster (T)
Eastern prairie fringed orchid (T)
Geocarpon (T)
Mead's milkweed (T)
Missouri bladder-pod (T)
Pondberry (E)
Running buffalo clover (E)
Virginia sneezeweed (T)
Western prairie fringed orchid (T)

Appendix I: Fuel Model Descriptions (from Anderson 1982)

Fuel Model 1 B Short Grass (NFDRS Models A&L)

In this Fuel Model, fire spread is governed by the fine herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through cured grass and associated material. Very little shrub or timber is present, generally less than one-third of the area.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	0.7
Dead fuel load, 3-inch, tons/acre	0.7
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	1.0

Model output, using a midflame windspeed of 5 mi/hr (8 km/hr) and a fine dead fuel moisture of 8%, gives a 78 ch/hr rate of spread and 4 foot flame length. In other words, expect a fast-moving fire of moderate intensity.

Fuel Model 2 B Grass/Timber (NFDRS Models C&T)

Fire spread is primarily through the fine herbaceous fuels, either curing or dead. These are surface fires where the herbaceous material, besides litter and dead-down stemwood from the open shrub or timber overstory, contribute to the fire intensity. Open shrub lands and pine stands or scrub oak stands that cover 1/3 to 2/3 of the area may generally fit this model but may include clumps of fuels that generate higher intensities and may produce firebrands.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	4.0
Dead fuel load, 3-inch, tons/acre	2.0
Live fuel load, foliage, tons/acre	1.0
Fuel bed depth, feet	1.0

Model output, using a midflame windspeed of 5 mi/hr (8 km/hr) and a fine dead fuel moisture of 8%, gives a 35 ch/hr rate of spread and 6 foot flame length. In other words, expect a moderately fast-moving fire of moderate intensity.

Fuel Model 3 B Tall Grass (NFDRS Model N)

Fires in this fuel are the most intense of the grass group and display high rates of spread under the influence of wind. Wind may drive fire into the upper heights of the grass and across standing water. Stands are tall, averaging about 3 feet, but considerable variation may occur. Approximately one-third or more of the stand is considered dead or cured and maintains the fire.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	3.0
Dead fuel load, 3-inch, tons/acre	3.0
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	2.5

Model output, using a midflame windspeed of 5 mi/hr (8 km/hr), a fine dead fuel moisture of 8%, and a live fuel moisture content of 100%, gives a 104 ch/hr rate of spread and 12 foot flame length. In other words, expect an extremely fast-moving fire of high intensity.

Fuel Model 6 B Dormant Brush (NFDRS Model F)

A broad range of shrub conditions is covered by this model. Fires carry in the shrub layer where foliage is somewhat flammable, but require moderate winds (8 mi/hr) at midflame height. This fuel model may also be applicable to shrub areas with less flammable foliage, but lower fuel moisture conditions.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	7
Dead fuel load, 3-inch, tons/acre	1.5
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	2.5

Model output, using a midflame windspeed of 5 mi/hr (8 km/hr), a fine dead fuel moisture of 8%, and a live fuel moisture content of 100%, gives a 32 ch/hr rate of spread and 6 foot flame length. In other words, expect a moderately fast-moving fire of moderate intensity. Fire will drop to the ground at low windspeeds or openings in the stand.

Fuel Model 8 B Close Timber Litter (NFDRS fuel models H & R)

Slow-burning ground fires with low flame lengths are generally the case, although the fire may encounter an occasional "jackpot" or heavy fuel concentration that can flare up. Only under severe weather conditions involving high temperatures, low humidities, and high winds do the fuels pose fire hazards. Closed canopy stands of short-needle conifers or hardwoods that have leafed out support fire in the compact litter layer. This layer is mainly needles, leaves, and occasionally twigs because little undergrowth is present in the stand. Representative conifer types are white pine, and lodgepole pine, spruce, fir, and larch.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch

dead and live, tons/acre	5.0
Dead fuel load, 4-inch, tons/acre	1.5
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	0.2

Fuel Model 9 B Hardwood Litter (NFDRS Model K)

The vegetation component of this fuel model is open or closed hardwood stands and mixed stands with leaf off. The litter layer often contains dead leaves which are subject to moving around under windy conditions. There are scattered concentrations of dead-down woody material.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	3.5
Dead fuel load, 3-inch, tons/acre	2.9
Live fuel load, foliage, tons/acre	0
Fuel bed depth, feet	0.2

Model output, using a midflame windspeed of 5 mi/hr (8 km/hr), fine dead fuel moisture of 8%, and live fuel moisture content of 100%, gives an 8 ch/hr rate of spread and 3 foot flame length. Thus, fires in this fuel type will generally be slow-moving and not very intense, but spotting problems from rolling and blowing leaves may occur in windy conditions. Under these conditions, rates of spread may be greater than predicted. Concentrations of dead-down woody material will contribute to possible torching out of trees, spotting, and crowning.

Fuel Model 10 B Timber – Litter Understory (NFDRS Model G)

The fires burn in the surface and ground fuels with greater fire intensity than the other timber litter models. Dead-down fuels include greater quantities of 3-inch (7.6-cm) or larger Iimbwood resulting from overmaturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting, and torching of individual trees are more frequent in this fuel situation, leading to potential fire control difficulties. Any forest type may be considered if heavy down material is present; examples are insect- or disease-ridden stands, windthrown stands, overmature situations with deadfall, and aged light thinning or partial-cut slash.

Fuel model values for estimating fire behavior

Total fuel load, < 3-inch dead and live, tons/acre	12.0
Dead fuel load, 4-inch, tons/acre	3.0

Live fuel load, foliage, tons/acre	2.0
Fuel bed depth, feet	1.0

The fire intensities and spread rates of these timber litter fuel models are indicated by the following values when the dead fuel moisture content is 8 percent, live fuel moisture is 100 percent, and the effective windspeed at midflame height is 5 mi/h (8 km/h):

	Rate of spread	**Flame length**
Model	*Chains/hour*	*Feet*
8	1.6	1.0
9	7.5	2.6
10	7.9	4.8

Fires such as above in model 10 are at the upper limit of control by direct attack. More wind or drier conditions could lead to an escaped fire.

Appendix J: Sample Private Land Agreement

GRANT OF PERMISSION TO BURN LANDS NOT ADMINISTERED BY THE U.S. FISH AND WILDLIFE SERVICE

Name of Owner Address (No. & Street, RFD, Box No., City, State, Zip Code) phone

Description of Owner's Lands to be burned:
The property is located in X County in township X, range X, section X, near the town of X off X. The area is located (insert description). The area to be managed with prescribed fire is approximately X acre(s) in size and lies entirely within the owners' property. Current vegetative cover consists of (describe).

PERMISSION IS HEREBY GRANTED by the landowner (Owner) whose signature appears below to the U.S. Department of the Interior, Fish and Wildlife Service (FWS) , and its authorized agents, to enter onto the lands as described above and identified in the attached Prescribed Fire Plan, which is made part of this document, and burn the vegetation in order to obtain benefits in the public interest such as improved wildlife habitat, restoration and maintenance of valued ecosystems, control of pests and diseases, wildfire hazard reduction and other public interest benefits.

Owner gives permission on the following conditions:

1. FWS will burn only in accordance with FWS's Prescribed Fire Plan.
2. FWS shall not charge Owner for the cost of burning Owner's Lands.
3. Owner certifies that Owner has inspected the above described lands and that there are no buildings or personal property on these lands which the Owner does not desire to be burned.
4. Any claim for personal injury or property damage proximately caused by the negligence of FWS employees may be filed in accordance with the Federal Tort Claims Act, 28 U.S.C. §§2671-2680.
5. Except as noted in paragraph 4, Owner agrees to hold the FWS harmless for any damage to any persons or property resulting from the prescribed burning of Owner's lands. This term does not extend to any lands not described above.
6. Other condition: None

OWNER GRANTS PERMISSION BEING FULLY ADVISED BY FWS OF THE RISKS OF BURNING

Signature of Owner Date

IMPORTANT: MUST BE ATTACHED TO PRESCRIBED FIRE PLAN UPON SIGNING

Appendix K: Preparedness Staffing Plan/Step-Up Plan

The Big Muddy NFWR step-up plan will be based on the daily Fire Danger Rating established by the National Interagency Fire Center. This Fire Danger Rating can be found on the U.S. Forest Service website at http://www.fs.fed.us/land/wfas/fd_class.gif.

Staffing guide based on daily Fire Danger Rating map.

Adjective Class	Step-Up Action
LOW	Normal Tour of Duty and Operations
MEDIUM	Normal Tour of Duty and Operations
HIGH	Normal Tour of Duty. Daily contact with DNR. Maintain pumpers for response at all times. Monitor daily weather forecasts.
VERY HIGH	Normal Tour of Duty for most staff. Daily contact with DNR. Contact cooperative agencies to discuss fire suppression response. Contact neighbors and Army guards to discuss fire danger. Monitor daily weather forecasts. Pumpers ready for response at all times. After 5 consecutive days: Use Emergency Presuppression account 9141-PE03 as needed from day to day. Request through RFMC. Consider weekend duty for two staff members. No off-unit fire assignments.
EXTREME	Normal Tour of Duty for most staff. Daily contact with DNR. Monitor daily weather forecasts. Consider weekend duty for two staff members. Monitor daily weather forecasts. Pumpers ready for response at all times. Use Emergency Presuppression account 9141-PE03 as needed from day to day. No off-unit fire assignments. Close Unit to smoking and post signs. Follow State fire regulations. Consider closing Unit to the public. No prescribed burning.

Table 4 – Current Employee Fire Qualifications

As of January 2011

NAME	POSITION	QUALIFICATIONS
Tom Bell	Refuge Manager	
Dean Bossert	Assistant Refuge Manager	FFT2
Molly Comstock	Administrative Officer	
Tim Haller	Park Ranger	HMGB-T, HECM, ABRO-T, FFT1
Wedge Watkins	Wildlife Biologist	
Randy Stenberg	Maintenance	FFT2
Jestin Clark	Wildlife Refuge Specialist	FFT2
Wes Verrill	LE Officer	

FFT1- Firefighter Type 1
FFT2 - Firefighter Type 2
RXB2- Prescribed Fire Burn Boss Type 2
RXB3- FWS Prescribed Fire Burn Boss Type 3
RXCM - Prescribed Fire Crew Member
ENOP - Engine Operator
FALB - Class B Faller
FEMO - Fire Effects Monitor
FIRB-Firing Boss
FOBS - Field Observer
HECM-Helicopter Crewmember
HELB-Helicopter Boss
ICT4 - Incident Commander Type 4
TFLD- Task Force Leader
ENGB - Engine Boss
HMGB - Helicopter Manager
ABRO - Aircraft Base Radio Operator

Appendix L: Normal Unit Strength Equipment

For a complete inventory, reference the Engine, Saw, and Equipment Locker Inventory Files stored on file in the fire filing cabinet under Equipment.

The following equipment is available for emergency fire suppression and prescribed burns:

Item	Description	Quantity
Vehicles		
Truck	2006 Chevy Crew Cab 2500HD	1
Truck	2011 Ford F150 4X4 pickup	1
Truck	2012 Ford F350 4X4 pickup	1
ATVs		
ATV	Polaris 500 4X4	1
UTV	Kawasaki Mule 3010 4X4	1
UTV	Kawasaki Mule 4010 4X4	1
Slip-on tanks		
	50 gallon polyethylene w/ spray wand (on Mule)	2
Chainsaws		
	Stihl 044 (on E-6551)	1
	Stihl 440 Magnum (on E-6552)	1
Blowers		
	Backpack Blower - Stihl BR 600	1
Pumps		
	Honda Trash Pump	1

Appendix M: Big Muddy NFWR Fire Dispatch Plan

When report of smoke or fire is received get as much information from the caller as possible:

Location of smoke or fire
Location of caller
Name and telephone number of caller
Color of smoke
Size of fire
Type of fuel
Character of the fire (running, smoldering)
Anyone fighting the fire?
Did the caller see anyone in vicinity or vehicles leaving the area?
Weather at fire location (particularly wind speed and direction, precipitation)

- Check map location of fire and determine status.
- Contact cooperators. If fire is on Unit, dispatch a Refuge Resource Advisor and, if qualified firefighters are on staff, dispatch them with :-ton pickup with 200 gallon pumper and drip torches.
- Notify Refuge Manager
- Notify South Zone FMO
- Maintain a log of all radio and telephone communications.
- Remain on duty and dispatch further assistance as ordered from fire.

Appendix N: Firecode Entry Form

INFORMATION NEEDED FOR FIRECODE ENTRY

If you have a wildfire, fill out this form and fax to the ZFMO at 217/224-8583
The ZFMO office will enter the information into Fire Code and fax back the wildfire number that is generated.

DISCOVERY DATE:_____ ACRES:_____

DISCOVERY TIME:_____

INCIDENT NAME:_____

AGENCY NAME:_____OR (IL-COR, IA-PTL, IA-NSR, ETC.)

LATITUDE:_____LONGITUDE:_____
Degrees, minutes, seconds Degrees, minutes, seconds

COMMENTS:_____

_____

_____

_____

_____

_____

_____

Appendix O: Annual Refuge Fire Management Activities

Table 11: Annual Refuge Fire Management Activities

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Update Interagency Fire Agreements/AOP's	x											
Winterize Fire Management Equipment											x	
Inventory Fire Engine and Cache		x										
Complete Training Analysis	x											
Annual Refresher Training			x									
Annual Fitness Testing			x									
Pre-Season Engine Preparation			x									
Weigh Engines to verify GVW Compliance			x									
Prescribed Fire Plan Preparation	x											
Review and Update Fire Management Plan				x								
Prepare Pre-season Risk Analysis			x									

Activities should be completed prior to the end of the month that is indicated.

Appendix P: Monitoring Checklist

RECOMMENDED FIRE MONITORING STANDARDS

The following are the recommended standards to be used when planning, implementing, and evaluating prescribed burns. These should be viewed as minimum values to be monitored and the information contained in this check list incorporated into a monitoring record sheet.

Planning and Preparation

Environmental Conditions Prior to the Burn

____ Photo Points Established
____ Fuel
____ Model(s)
____ Loading (By Size Class)
____ % Cover (Type/Model)
____ Continuity
____ Crown ratio
____ Depth of Fuel Bed
____ Other
____ Air Temperature (Maximum - Minimum to develop trends)
____ Relative Humidity (Maximum - Minimum to develop trends)
____ Wind Speed and Direction (Eye-level/20 Foot)
____ Fuel Moisture
____ Dead Fuel Moisture (Use of Fuel Sticks and/or Drying Ovens highly recommended)
____ Live Fuel Moisture (Fuel Models 2,4,5,7,10)
____ Soil Moisture (Dry, Moist, Wet)
____ Drought Indicator (Track One or More)

Execution

Environmental Conditions During the Burn

____	Date/Time		
____		Air Temperature	(Every 30 minutes)
____		Relative Humidity	(Every 30 minutes)
____			Wind Speed and Direction (Eye Level) (Every 30 minutes)
____	Cloud Cover		
____			Fuel Moisture (Indicate How Determined: Calculated, Actual)
____	Dead Fuel Moisture (Using above values, calculate every 30 minutes utilizing Tables and Worksheets, Nomograms, BEHAVE, etc.)		
____	Live Fuel Moisture (Fuel Models 2,4,5,7,10 - Collect immediately prior to the burn and evaluate later)		

Fire Behavior

____		Flame length	(Head, Flank, Backing)
____		Rate of Spread	(Forward, Flank, Backing)
____	Resistance to Control		
____	Spotting Distance		

Smoke/Air Quality

____		Mixing/Dispersal	(Good, Fair, Poor)
____		Trajectory of Column	(Surface/Upper Level)
____		Duration	(Active Burning/Smoldering)
____	Problems		

Note: It is recommended that photos be taken to document smoke dispersal.

Post Burn

First Order Fire Effects

____ Photo Point
____ Percent of Area Burned
____ Percent of Fuels Consumed (By Fuel Loading Size Class, when possible)
____ Percent of Thatch/Duff Consumed
____ Scorch Height
____ Mortality

Note: The information in the first two categories will be used to determine the amount of particulate matter produced, and may/will be used by State Air Quality Regulators.

APPENDIX Q:
WILDFIRE OCCURRENCE HISTORY

A small wildlfire (<15 acres) occurred on the Lisbon Bottoms unit in 2005. A 14 acre wildfire occurred on the Cranberry Bend unit in the Spring of 2011.

APPENDIX R: DELEGATION OF AUTHORITY

Big Muddy NWR
Columbia, Missouri

As of (time) , (Date) , I have delegated authority to manage the (Fire Incident Name) , (Fire Number) , Big Muddy NWR, to Incident Commander (Name) and his/her Incident Management Team.

As Incident Commander, you are accountable to me for the overall management of this incident including it's control and return to local forces. I expect you to adhere to relevant and applicable laws, policies, and professional standards. While the suppression of the fire is your primary task, you are expected to do so in a manner that provides for the safety and well being of involved personnel. Consideration for the needs of local residents and communities is essential for successful management of the incident.

I am assigning (name) as the line officer representative to act as liaison and provide any help you need. (S)he is authorized to speak for me in the event a decision is needed.

My specific considerations for management of this fire are:

1. Ensure the safety of firefighters, visitors, and neighbors.
2. Protect private and Refuge property to the extent possible.
3. Minimize damage to environmental resources
4. Key resource considerations are: protecting rare, threatened, and endangered species; preserving as much wildlife habitat as possible; avoiding wildlife entrapment situations; and limiting degradation of the Refuge's aesthetic values.
5. Restrictions for suppression actions are no earthmoving equipment (dozers, discs, plows, graders) without approval of the Project Leader.
6. Manage the fire cost-effectively for the values at risk.
7. Provide training opportunities for U. S. Fish and Wildlife personnel where possible in order to strengthen our organizational capabilities.

(Signed) (Date)

Project Leader

Appendix S: Public Comments on FMP and EA

Barbara Moran – 1/6/2012

Appendix Q - The refuge has had a wildfire, at Lisbon Bottom Unit west of the county road about 6? years ago. The fire set back the cottonwoods and resulted in a healthy stand of Johnson grass. Don't know if the tree sprouts or the Johnson grass are winning the competition for dominance today, but I would guess that the grass has the upper hand due to the fire reducing the tree shade. I could find no discussion in the plan or the EA about the effects of fire on Johnson grass rejuvenation and expansion. When Johnson grass is present in the stand to be burned, as is the case in several of the native grass stands on the refuge, it will be invigorated by the fire, as will the native grasses. Caution, and perhaps chemicals, will need to be exercised to see that the natives win.

Also, the documents state that the refuge is 60% bottomland forest. It should be pointed out that most of these acres are not mature bottomland forest, but seedling and sapling stands of bottomland forest species. The fuels in a doghair stand of young cottonwoods is much different from those in a mature stand.

APPENDIX T: ENVIRONMENTAL ASSESSMENT

The Environmental Assessment (EA) to the Big Muddy NWR Wildland Fire Management Plan is included as NEPA documentation. Fire is an integral part of the local ecosystem and is addressed in the EA.

UNITED STATES FISH AND WILDLIFE SERVICE

ENVIRONMENTAL ACTION STATEMENT (EAS)
(REGION 3)

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and have determined that the action of the use of prescribed burning for habitat improvement purposes, when conducted in accordance with local and State ordinances and laws and fire management activities, including prevention and restoration measures, when conducted in accordance with departmental and Service procedures

___ Is a categorical exclusion as provided by 516 DM 6 Appendix 1. No further documentation will be made. See 516 DM 6 Appendix 1.4B (4 & 5).

_X_ Is found not to have significant environmental effects as determined by the attached Environmental Assessment and Finding of No Significant Impact.

__ is covered under an existing Environmental Assessment

___ Is found to have significant effects; and, therefore, a "Notice of Intent" will be published in the Federal Register to prepare and Environmental Impact Statement before the project is considered further.

___ Is denied because of environmental damage, Service policy, or mandate.

___ Is an emergency situation. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

Other supporting documents: Big Muddy National Wildlife Refuge Fire Management Plan
Other supporting documents (list):

_X_ Environmental Assessment and FONSI
____ Compatibility Determination
____ Public comments
____ Intra-Service Section 7 Evaluation

(1) _____ _____ (2) _____
Initiator Date RHPO Date

(3) _____ _____ (4) _____
ARD (AF, AFWE, ARW) Date Regional Director Date